

Product Catalog

Effective Date: November 2010



Made in America



EF Johnson Technologies

COMPANY FACTS

Date Founded: October 1923

Corporate Headquarters: Irving, TX

Operations/Manufacturing: Dallas Metroplex

Website: www.efjohnsontechnologies.com

Management Team:

Andy Adams,
President & Chief Executive Officer

Jana A. Bell,
Executive Vice President & Chief Financial Officer

Ed Kelly,
Vice President, Marketing & Business Development

John Oblak,
Vice President, Standards & Regulatory Affairs

John Suzuki,
Senior Vice President, Sales

Ron Thompson,
Vice President, Customer Service

Ed Pierson,
Vice President, Performance Excellence
& Chief Information Officer

Sandi Knight,
Vice President, Human Resources

Elaine Flud Rodriguez,
Senior Vice President & General Counsel

Corporate Profile

EF Johnson Technologies focuses on innovating, developing and marketing the highest quality secure communications solutions to organizations whose mission is to protect and save lives. The Company's customers include first responders in public safety and public service, the federal government, and industrial organizations.



Product Overview

Trunked, Conventional, and Hybrid Project 25 Radio Systems

Our IP25™ Infrastructure Systems provide a secure, interoperable, and flexible Voice over Internet Protocol (VoIP) solution for building out a Project 25 network for first responders.

Portable and Mobile Radios

Our award-winning radios are used throughout the world by military, police, fire, paramedics, and homeland security personnel. We were the first supplier to implement the Enhanced Full-Rate Digital Vocoder (AMBE+2) into our radios for superior digital sound. Our radios have remarkable versatility because of their interoperability with Project 25 trunked and conventional modes, APCO 16 Motorola SMARTNET®/SmartZone®, and an option for Project 25 Phase II TDMA.

Voice Encryption

We offer voice privacy modules for most any brand and model of analog two-way radio to prevent unwanted eavesdropping on critical communications. Our scramblers are used in 10,000 systems in more than 120 countries throughout the world.

EF Johnson Technologies focuses on innovating, developing and marketing the highest quality secure communications solutions to organizations whose mission is to protect and save lives.

Corporate Headquarters - Irving, TX

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Washington, DC

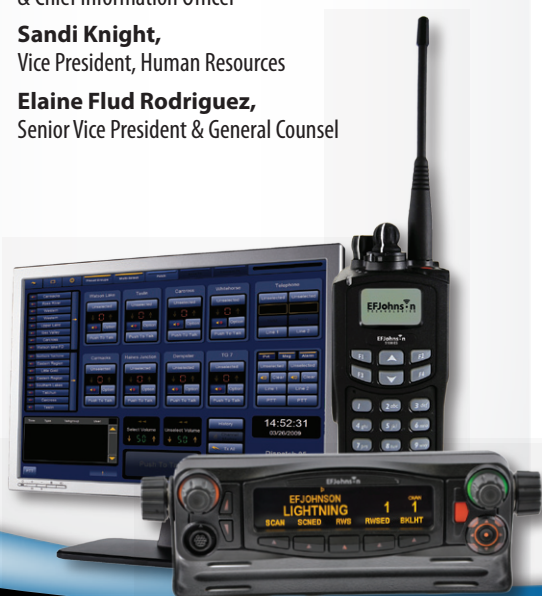
9715 Key West Ave., #500
Rockville, MD 20850

Lincoln, NE

3900 NW 12th Street, #200
Lincoln, NE 68521

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Waseca, MN 56093



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Updated 11/4/10

SMARTNET®



SmartZone®



EFJohnson
TECHNOLOGIES
We Respond.

www.efjohnsontechnologies.com

BENELEC

Professional Wireless Solutions



Portable Radios

BENELEC.COM.AU

Benelec Pty Ltd. Unit 2/581-587 Gardeners Road, Mascot NSW 2020, T: +61-2-9364 7000, F: +61-2-93647099, E: inquiries@benelec.com.au

51FIRE ES Series Portable Radio

7/800 MHz • UHF • VHF

PUBLIC SAFETY
Communications
2010 **HOT** PRODUCT

KEY FEATURES & BENEFITS

All 51FIRE ES Series Portables Come with the Following Standard Features:

- ▶ Bright yellow colored housing
- ▶ MDC-1200 & GE-Star Signaling
- ▶ Factory mutual intrinsically safe rated
- ▶ Immersion rated housing
- ▶ Both round & blade knobs are included

Also
made for
firefighters:



The Fireground™ Speaker Mic

Choose the durable Fireground™ speaker microphone to accompany the 51FIRE ES for exceptional voice quality. The Fireground™ provides clear, amplified sound and is completely immersible.



Designed for Firefighters, Engineered for Safety

The 51FIRE ES is specially designed with your needs in mind. Your safety and the safety of the citizens you serve are paramount; reliable communications just can't be sacrificed. That's why the 51FIRE ES is packed with standard features so you don't have to worry about losing communications, especially at the most crucial times. The 51FIRE ES allows you to focus on what's most important: fighting fires and saving lives.

Standard Yellow Housing

Visible even in extreme conditions.

MDC-1200 & GE-Star Signaling

Provides clear alerts to and from the dispatcher to signal both emergency and PTT (Push to Talk) ID.

Factory Mutual Intrinsically Safe

Meets hazardous environment requirements.

Immersible IP-67

Immersible to a depth of 1 meter for 30 minutes (per MIL spec 810F and IP67 standards).

Large Round or Blade Knobs and PTT Button

The 51FIRE ES offers a solution to bulky fire gloves. Large buttons and knobs ensure your communications are transmitted even when gloves are worn. You can use the optional blade knobs to make your radio even easier to operate!



Enhanced AMBE+2 P25 Vocoder

Hear the Difference! The fire-preferred AMBE+2 Vocoder provides loud, clear digital audio that substantially filters out background noise. Upgrade to the AMBE+2 (v 1.6) Vocoder to optimize audio quality and reduce background noise even more when a PASS alarm is sounding.

Optional Out of Range (OOR) Feature

You can't go where you can't communicate, but how do you know when you're out of range? The intuitive OOR feature alerts you when radio communications are lost with the EFJohnson IP25™ Conventional System. The feature works in both P25 digital and analog modes and provides an alert that is easily recognized.

SMARTNET®



SmartZone®



EFJohnson
TECHNOLOGIES
We Respond.

www.efjohnsonstechnologies.com

51FIRE ES Series Portable Radio

700/800 MHz • VHF • UHF

Typical Performance Specifications

| GENERAL | 700/800 | VHF | UHF R1 | UHF R2 |
|-----------------------------------|---|---------------------------------------|---------------------------------------|---------------------------------------|
| Frequency Range | 762–806 MHz 806–870 MHz | 136–174 MHz | 380–470 MHz | 450–512 MHz |
| Channel Spacing | 12.5 kHz, 25 kHz | 12.5 kHz, 25 kHz | 12.5 kHz, 25 kHz | 12.5 kHz, 25 kHz |
| Maximum Frequency Separation | Full Bandsplit | Full Bandsplit | Full Bandsplit | Full Bandsplit |
| FCC Type Acceptance Certification | ATH2425171 | ATH2425111 | ATH2425131 | ATH2425141 |
| Canada Type Certification | IC: 933B-2425171 | IC: 933B-2425112 | IC: 933B-2425131 | IC: 933B-2425141 |
| FCC Emissions Designators | 11K0F3E, 16K0F3E, 14K0F3E, 8K10F1E, 8K10F1D | 16K0F3E, 11K0F3E, 8K10F1E, 8K10F1D | 16K0F3E, 11K0F3E, 8K10F1E, 8K10F1D | 16K0F3E, 11K0F3E, 8K10F1E, 8K10F1D |
| Input Voltage | 7.2 V | | | |
| Dimensions (w/o antenna) (HxWxD) | 6.7" x 2.52" x 1.8" (6.4 cm x 17.0 cm x 4.6 cm) | | | |
| Weight (without standard battery) | 11 oz. (312 g) | | | |
| Case | Polycarbonate—yellow Immersion rated option available for all housings | | | |
| Temperature Range | –30°C to +60°C | | | |
| Vocoder | Enhanced Full-Rate Digital Vocoder (AMBE+2) Project 25 | | | |

TRANSMITTER

| | | | | |
|--------------------------------------|---------------------------------------|----------|----------|----------|
| RF Power Output | 2.5/1 W (700 MHz), 3/1 W (800 MHz) | 5/1 W | 4/1 W | 4/1 W |
| Frequency Stability (–30°C to +60°C) | ±1.5 ppm | ±1.5 ppm | ±1.5 ppm | ±1.5 ppm |
| Modulation Limiting | | | | |
| 25 kHz channels | ±5 kHz | ±5 kHz | ±5 kHz | ±5 kHz |
| 12.5 kHz channels | ±2.5 kHz | ±2.5 kHz | ±2.5 kHz | ±2.5 kHz |
| Emissions (Conducted/Radiated) | –75 dBc | –75 dBc | –75 dBc | –75 dBc |
| Audio Response | +1, –3dB | +1, –3dB | +1, –3dB | +1, –3dB |
| FM Hum and Noise | | | | |
| 25 kHz channels | –40 dB | –45 dB | –45 dB | –45 dB |
| 12.5 kHz channels | –35 dB | –40 dB | –40 dB | –40 dB |
| Audio Distortion | 2% | 2% | 2% | 2% |

RECEIVER

| | | | | |
|--------------------------------------|--------------------|--------------------|--------------------|--------------------|
| Audio Output Power | 500 mW | 500 mW | 500 mW | 500 mW |
| Frequency Stability (–30°C to +60°C) | ±1.5 ppm | ±1.5 ppm | ±1.5 ppm | ±1.5 ppm |
| Selectivity | | | | |
| Analog Mode: 12 dB SINAD | 0.25 uV (–119 dBm) | 0.25 uV (–119 dBm) | 0.25 uV (–119 dBm) | 0.25 uV (–119 dBm) |
| Digital Mode: 5% BER | 0.25 uV (–119 dBm) | 0.25 uV (–119 dBm) | 0.25 uV (–119 dBm) | 0.25 uV (–119 dBm) |
| Selectivity | | | | |
| 25 kHz channels | –75 dB | –75 dB | –75 dB | –75 dB |
| 12.5 kHz channels | –63 dB | –63 dB | –63 dB | –63 dB |
| Intermodulation | –75 dB | –75 dB | –75 dB | –75 dB |
| Spurious & Image Rejection | –75 dB | –75 dB | –75 dB | –75 dB |
| FM Hum and Noise | | | | |
| 25 kHz channels | –40 dB | –40 dB | –40 dB | –40 dB |
| 12.5 kHz channels | –35 dB | –35 dB | –35 dB | –35 dB |
| Audio Distortion | 2% | 2% | 2% | 2% |

BATTERIES

| | | | |
|------------------------------|--------------------|--------------|--|
| Battery Type | Dimensions (HxWxD) | Weight | Approx. Life (5/5/90) |
| Extra-High Capacity NiMH, IS | 6.0 x 2.3 x 0.85 | 12.96 ounces | UHF/VHF: Minimum 10 hours 700/800 MHz: Minimum 12 hours |

Specifications are measured per TIA 102.CAA-B,
TIA 102.CAAB-B and per TIA 603-C.

All EFJohnson radios are made in the U.S.A.



Form S851 5/10 Printed in U.S.A.

Specifications subject to change without notice.

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EFJohnson. SMARTNET, SmartZone, and Motorola are trademarks of Motorola, Inc.



ENVIRONMENTAL SPECIFICATIONS

| Environment | Mil Spec | 810F |
|-----------------|----------|--------|
| Low Pressure | M 500.4 | P II |
| High Temp. | 501.4 | I, II |
| Low Temp. | 502.4 | I, II |
| Temp. Shock | 503.4 | I |
| Solar Radiation | 505.4 | I |
| Rain/Blown Rain | 506.4 | I, III |
| Humidity | 507.4 | NA |
| Salt Fog | 509.4 | NA |
| Dust and Sand | 510.4 | I |
| Vibration | 514.5 | I(24) |
| Shock | 516.5 | I, IV |
| Immersion* | 512.4 | I |

M=Method P=Procedure
Also meets equivalent
superseded C, D, and
E standards
*Optional



ENCRYPTION OPTIONS

| | |
|-----------------------------------|---|
| Supported Encryption Algorithms | AES, DES, DES-OFB |
| Encryption Keys/Radio | 64 Common Key Reference (CKR) 64 Physical Identifier (PID) Compatible with Motorola Key Variable Loader |
| Encryption Frame Re-sync Interval | P25 CAI 360 msec |
| Encryption Keying | External Key Loader, OTAR |
| Synchronization | CFB – Cipher Feedback OFB – Output Feedback |
| Vector Generator | National Institute of Standards and Technology (NIST) approved random number generator |
| Encryption Type | Digital |
| Key Erasure | Keyboard Command |
| Code Key Initialization | Internal pseudorandom generator |
| Standards | FIPS 46–3, FIPS 81, FIPS 140–2, FIPS 197 |



FACTORY MUTUAL APPROVALS

| | | |
|---------------------------|---|---|
| Intrinsically Safe | | |
| Class I | Division 1 An area where there is or could be an explosive atmosphere most of the time in normal conditions. | C Ethylene D Propane and Methane E Conductive metal F Carbonaceous material coal, coke dust G Grain dust and flour |
| Class II | | |
| Class III | Division 1 Location in which easily ignitable fibers or materials producing combustible flyings are handled, manufactured, or used. | Ignitable fibers or flyings |
| Non-Incendive | | |
| Class I | Division 2 An area where an explosive atmosphere exists only as a result of a fault. | A Acetylene B Hydrogen C Ethylene D Propane and Methane |



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FIRESafe™ Software

for ES Series Portable Radios

Enhances Communication Awareness, Simple to Use

FIRESafe™ can be used with any ES Series portable radio. Communication awareness is enhanced, which is necessary in environments such as a dynamic fire scene, allowing first responders to focus on the mission at hand.



Set & Forget

The keypad and channel selector are locked as well as the volume level. Cannot turn radio off. A single button press switches the radio from dispatch mode to Fireground mode.

Evacuation Alert

Firefighters receive a loud alert tone. Digital signaling has a higher likelihood of being received because it is a short burst, repeatable data message.

Visual & Audible Range Indicator

In addition to a visual RSSI, two warning tones are emitted when the RSSI level drops below a predefined threshold. Four warning tones warns of impending communications loss.

Out of Range Alert

Signals the firefighter that he has lost communications through a visual and audible out of range alert tone.

IP25™ System "Heartbeat"

Command radio transmits P25 digital heartbeat in-between voice transmissions. First responder radio expects to receive either voice traffic or heartbeat. In absence of either, radio will activate OOR audible and visual indicators alerting first responder that he is no longer in range of command radio.

P25 Auto Switch

Radio automatically switches to digital mode when analog transmissions become unclear. Once transmissions become clear enough, the radio will automatically switch back to analog mode.

Com Check

Enables the firefighter to quickly depress a button to perform a communications check to determine the strength of his signal.

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51LT ES series Portable Radio

700/800 MHz • VHF • UHF

KEY FEATURES & BENEFITS

- ▶ Display and 7 programmable keys
- ▶ 16 position channel selector
- ▶ 3 position rotary switch for zone control
- ▶ 48 channel/talkgroups standard with 128 optional
- ▶ Supports MDC-1200 and GE-Star Signaling
- ▶ Emergency button
- ▶ Menu function
- ▶ Lithium Ion battery is standard, 5 oz. lighter than Nickel Metal Hydride
- ▶ 5100 ES Series compatible battery, chargers and audio accessories
- ▶ Durable polycarbonate housing provides exceptional strength in a lightweight package
- ▶ Easy radio programming and feature updating using EFJohnson's PC Configure™ software

Extensive Accessory Suite

- ▶ Complete line of accessories including speaker microphones, headsets, surveillance kits, batteries, chargers, and carrying apparatus. Visit our website for the *EFJohnson Subscriber Accessories Catalog!*



Slim profile and 5 oz. lighter with standard Lithium Ion battery.



First-responder interoperability, P25 compliant, high-tier hardware... at an affordable price.

The 51LT ES Portable Radio from EF Johnson Technologies is durable, lightweight, and versatile. The 51LT ES is ideal for agencies with a limited budget, who are seeking a simple solution to P25 compliance. The 51LT ES offers crisp and powerful digital audio with the AMBE +2 vocoder and Project 25 conventional capability in every radio. Also included is a choice between Project 25 trunked or SMARTNET®/SmartZone® trunked capability. If you need a straightforward portable radio that is flexible and interoperable, then make the 51LT ES your clear product choice.

▶ Project 25 Compliance

Supports Project 25 CAI (Common Air Interface) and Project 25 trunked system protocols.

▶ SMARTNET®/ SmartZone® Interoperability

EFJohnson is the only supplier licensed to support both analog and digital SMARTNET and SmartZone trunking protocols.

▶ AMBE+2 Vocoder for Outstanding Voice Quality and Noise Reduction

Hear the Difference! EFJohnson is one of the only radio manufacturers with a full implementation of this second generation digital vocoder (AMBE+2), P25 preferred vocoder.

SMARTNET®



SmartZone®



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51LT ES Series Portable Radio

700/800 MHz • VHF • UHF

Typical Performance Specifications

| GENERAL | 700/800 | VHF | UHF R1 | UHF R2 |
|-----------------------------------|--|---------------------------------------|---------------------------------------|---------------------------------------|
| Frequency Range | 762–806 MHz 806–870 MHz | 136–174 MHz | 380–470 MHz | 450–512 MHz |
| Channel Spacing | 12.5 kHz, 25 kHz | 12.5 kHz, 25 kHz | 12.5 kHz, 25 kHz | 12.5 kHz, 25 kHz |
| Maximum Frequency Separation | Full Bandsplit | Full Bandsplit | Full Bandsplit | Full Bandsplit |
| FCC Type Acceptance Certification | ATH2425171 | ATH2425111 | ATH2425131 | ATH2425141 |
| Canada Type Certification | IC: 933B-2425171 | IC: 933B-2425112 | IC: 933B-2425131 | IC: 933B-2425141 |
| FCC Emissions Designators | 11K0F3E, 16K0F3E, 14K0F3E, 8K10F1E, 8K10F1D | 16K0F3E, 11K0F3E, 8K10F1E, 8K10F1D | 16K0F3E, 11K0F3E, 8K10F1E, 8K10F1D | 16K0F3E, 11K0F3E, 8K10F1E, 8K10F1D |
| Input Voltage | 7.2V | | | |
| Dimensions (w/o antenna) (HxWxD) | 6.7" x 2.52" x 1.8" (6.4 cm x 17.0 cm x 4.6 cm) | | | |
| Weight (without standard battery) | 13 ounces | | | |
| Case | Polycarbonate—black/blue | | | |
| Temperature Range | –30°C to +60°C | | | |
| Vocoder | Enhanced Full-Rate Digital Vocoder (AMBE+2) Project 25 | | | |

TRANSMITTER

| | | | | |
|--------------------------------------|---------------------------------------|----------|----------|----------|
| RF Power Output | 2.5/1 W (700 MHz), 3/1 W (800 MHz) | 5/1 W | 4/1 W | 4/1 W |
| Frequency Stability (–30°C to +60°C) | ±1.5 ppm | ±1.5 ppm | ±1.5 ppm | ±1.5 ppm |
| Modulation Limiting | | | | |
| 25 kHz channels | ±5 kHz | ±5 kHz | ±5 kHz | ±5 kHz |
| 12.5 kHz channels | ±2.5 kHz | ±2.5 kHz | ±2.5 kHz | ±2.5 kHz |
| Emissions (Conducted/Radiated) | –75 dBc | –75 dBc | –75 dBc | –75 dBc |
| Audio Response | +1, –3dB | +1, –3dB | +1, –3dB | +1, –3dB |
| FM Hum and Noise | | | | |
| 25 kHz channels | –40 dB | –45 dB | –45 dB | –45 dB |
| 12.5 kHz channels | –35 dB | –40 dB | –40 dB | –40 dB |
| Audio Distortion | 2% | 2% | 2% | 2% |

RECEIVER

| | | | | |
|--------------------------------------|--------------------|--------------------|--------------------|--------------------|
| Audio Output Power | 500 mW | 500 mW | 500 mW | 500 mW |
| Frequency Stability (–30°C to +60°C) | ±1.5 ppm | ±1.5 ppm | ±1.5 ppm | ±1.5 ppm |
| Sensitivity | | | | |
| Analog Mode: 12 dB SINAD | 0.25 uV (–119 dBm) | 0.25 uV (–119 dBm) | 0.25 uV (–119 dBm) | 0.25 uV (–119 dBm) |
| Digital Mode: 5% BER | 0.25 uV (–119 dBm) | 0.25 uV (–119 dBm) | 0.25 uV (–119 dBm) | 0.25 uV (–119 dBm) |
| Selectivity | | | | |
| 25 kHz channels | –75 dB | –75 dB | –75 dB | –75 dB |
| 12.5 kHz channels | –63 dB | –63 dB | –63 dB | –63 dB |
| Intermodulation | –75 dB | –75 dB | –75 dB | –75 dB |
| Spurious & Image Rejection | –75 dB | –75 dB | –75 dB | –75 dB |
| FM Hum and Noise | | | | |
| 25 kHz channels | –40 dB | –40 dB | –40 dB | –40 dB |
| 12.5 kHz channels | –35 dB | –35 dB | –35 dB | –35 dB |
| Audio Distortion | 2% | 2% | 2% | 2% |

BATTERIES

| | | | |
|---------------------------|--------------------|------------|--|
| Battery Type | Dimensions (HxWxD) | Weight | Approx. Life (5/5/90) |
| High Capacity Lithium Ion | 6.5 x 2.3 x .78 | 8.1 ounces | UHF/VHF: Minimum 10 hours 700/800 MHz: Minimum 12 hours |

Specifications are measured per TIA 102.CAA-B, TIA 102.CAAB-B and per TIA 603-C.

All EFJohnson radios are made in the U.S.A.

ENVIRONMENTAL SPECIFICATIONS

| Environment | Mil Spec | 810F |
|-----------------|----------|--------|
| | M | P |
| Low Pressure | 500.4 | II |
| High Temp. | 501.4 | I, II |
| Low Temp. | 502.4 | I, II |
| Temp. Shock | 503.4 | I |
| Solar Radiation | 505.4 | I |
| Rain/Blown Rain | 506.4 | I, III |
| Humidity | 507.4 | NA |
| Salt Fog | 509.4 | NA |
| Dust and Sand | 510.4 | I |
| Vibration | 514.5 | I(24) |
| Shock | 516.5 | I, IV |

M=Method P=Procedure
Also meets equivalent superseded C, D, and E standards



5100 ES Series Portable Radio

7/800 MHz • UHF • VHF



KEY FEATURES & BENEFITS

Future Proof

- ▶ The 5100 ES protects your investment with a TDMA upgradable solution

Reliable & Rugged

- ▶ Aluminum casting and polycarbonate housing provide exceptional strength in a light weight package - feel the difference!
- ▶ Meets applicable Mil Standard 810C, D, E, and F specifications
- ▶ Approved by Factory Mutual as intrinsically safe for use in hazardous environments

Submersibility Option

- ▶ Immersible to a depth of 1 meter for 30 minutes (per MIL Spec 810F and IP67 standards)

Significant Product Flexibility

- ▶ Enables programming of up to 864 channel/talkgroups
- ▶ Supports both narrowband (12.5 kHz) and wideband (25 kHz) channel spacing, and multiple system protocols

Simplified Configuration Updates & Option Selection

- ▶ Over the Air Programming (OTAP) option enables you to program radios without having to send them to a service shop, saving time and costs
- ▶ Easy radio programming and feature updating using EFJohnson's PC Configure™ software for portable and mobile radios

Extensive Accessory Suite

- ▶ Complete line of accessories including speaker microphones, headsets, surveillance kits, batteries, chargers, carrying apparatus, and encryption keyloading devices. Visit our website for the *EFJohnson Subscriber Accessories Catalog!*



P25, SMARTNET®/SmartZone®, and TDMA in one radio!

The 5100 ES Series Portable Radios from EF Johnson Technologies meets the needs of first responders with a powerful portable radio that protects your investment for years to come. Specifically designed for public safety, the 5100 ES offers best-in-class digital audio with the Enhanced Full-Rate Digital Vocoder (AMBE+2), P25 trunked and conventional operation, and a sleek ergonomic design. If you need a multi-protocol portable radio that leads the industry in feature richness and system interoperability, then the 5100 ES Series Portable Radio is the right choice.

▶ Project 25 Compliance

Supports Project 25 CAI (Common Air Interface), Project 25 trunked and conventional system protocols, and Project 25 Over-the-Air Rekeying (OTAR) functionality.

▶ AMBE+2 Vocoder for Outstanding Voice Quality and Noise Reduction

Hear the Difference! EFJohnson is one of the only radio manufacturers with a full implementation of this second generation digital vocoder (AMBE+2), P25 preferred vocoder.

▶ SMARTNET® II / SmartZone® Interoperability

EFJohnson is the only supplier licensed to support both analog and digital SMARTNET II and SmartZone trunking protocols.

▶ Numerous Encryption Protocols

Supports industry-standard encryption capabilities such as AES, DES-OFB and DES. Ask about our free Single Key DES-OFB encryption for P25.

SMARTNET®



SmartZone®



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We Respond.

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5100 ES Series Portable Radio

700/800 MHz • VHF • UHF

Typical Performance Specifications

| GENERAL | 700/800 | VHF | UHF R1 | UHF R2 |
|-----------------------------------|--|---------------------------------------|---------------------------------------|---------------------------------------|
| Frequency Range | 762–806 MHz 806–870 MHz | 136–174 MHz | 380–470 MHz | 480–512 MHz |
| Channel Spacing | 12.5 kHz, 25 kHz | 12.5 kHz, 25 kHz | 12.5 kHz, 25 kHz | 12.5 kHz, 25 kHz |
| Maximum Frequency Separation | Full Bandsplit | Full Bandsplit | Full Bandsplit | Full Bandsplit |
| FCC Type Acceptance Certification | ATH2425171 | ATH2425111 | ATH2425131 | ATH2425141 |
| Canada Type Certification | IC: 933B-2425171 | IC: 933B-2425112 | IC: 933B-2425131 | IC: 933B-2425141 |
| FCC Emissions Designators | 11K0F3E, 16K0F3E, 14K0F3E, 8K10F1E, 8K10F1D | 16K0F3E, 11K0F3E, 8K10F1E, 8K10F1D | 16K0F3E, 11K0F3E, 8K10F1E, 8K10F1D | 16K0F3E, 11K0F3E, 8K10F1E, 8K10F1D |
| Input Voltage | 7.2 V | | | |
| Dimensions (w/o antenna) (HxWxD) | 6.7" x 2.52" x 1.8" (6.4 cm x 17.0 cm x 4.6 cm) | | | |
| Weight (without standard battery) | 11 oz. (312 g) | | | |
| Case | Polycarbonate—black, yellow, orange Immersion rated option available for all housings | | | |
| Temperature Range | –30°C to +60°C | | | |
| Vocoder | Enhanced Full-Rate Digital Vocoder (AMBE+2) Project 25 | | | |

TRANSMITTER

| | | | | |
|--------------------------------------|---------------------------------------|----------|----------|----------|
| RF Power Output | 2.5/1 W (700 MHz), 3/1 W (800 MHz) | 5/1 W | 4/1 W | 4/1 W |
| Frequency Stability (–30°C to +60°C) | ±1.5 ppm | ±1.5 ppm | ±1.5 ppm | ±1.5 ppm |
| Modulation Limiting | | | | |
| 25 kHz channels | ±5 kHz | ±5 kHz | ±5 kHz | ±5 kHz |
| 12.5 kHz channels | ±2.5 kHz | ±2.5 kHz | ±2.5 kHz | ±2.5 kHz |
| Emissions (Conducted/Radiated) | –75 dBc | –75 dBc | –75 dBc | –75 dBc |
| Audio Response | +1, –3dB | +1, –3dB | +1, –3dB | +1, –3dB |
| FM Hum and Noise | | | | |
| 25 kHz channels | –40 dB | –45 dB | –45 dB | –45 dB |
| 12.5 kHz channels | –35 dB | –40 dB | –40 dB | –40 dB |
| Audio Distortion | 2% | 2% | 2% | 2% |

RECEIVER

| | | | | |
|--------------------------------------|--------------------|--------------------|--------------------|--------------------|
| Audio Output Power | 500 mW | 500 mW | 500 mW | 500 mW |
| Frequency Stability (–30°C to +60°C) | ±1.5 ppm | ±1.5 ppm | ±1.5 ppm | ±1.5 ppm |
| Sensitivity | | | | |
| Analog Mode: 12 dB SINAD | 0.25 µV (–119 dBm) | 0.25 µV (–119 dBm) | 0.25 µV (–119 dBm) | 0.25 µV (–119 dBm) |
| Digital Mode: 5% BER | 0.25 µV (–119 dBm) | 0.25 µV (–119 dBm) | 0.25 µV (–119 dBm) | 0.25 µV (–119 dBm) |
| Selectivity | | | | |
| 25 kHz channels | –75 dB | –75 dB | –75 dB | –75 dB |
| 12.5 kHz channels | –63 dB | –63 dB | –63 dB | –63 dB |
| Intermodulation | –75 dB | –75 dB | –75 dB | –75 dB |
| Spurious & Image Rejection | –75 dB | –75 dB | –75 dB | –75 dB |
| FM Hum and Noise | | | | |
| 25 kHz channels | –40 dB | –40 dB | –40 dB | –40 dB |
| 12.5 kHz channels | –35 dB | –35 dB | –35 dB | –35 dB |
| Audio Distortion | 2% | 2% | 2% | 2% |

BATTERIES

| Battery Type | Dimensions (HxWxD) | Weight | Approx. Life (5/5/90) |
|------------------------------|---------------------|------------------------------|--|
| Extra-High Capacity NiMH | 6.0" x 2.3" x 0.85" | 12.96 ounces | UHF/VHF: Minimum 10 hours 700/800 MHz: Minimum 12 hours |
| Extra-High Capacity NiMH, IS | 6.0" x 2.3" x 0.85" | 12.96 ounces | UHF/VHF: Minimum 10 hours 700/800 MHz: Minimum 12 hours |
| Alkaline Battery Clamshell | 7.2" x 2.6" x 2.0" | 15.68 ounces (w/12 AA batt.) | 14–16 hours |
| High Capacity Lithium Ion | 6.5" x 2.3" x .78" | 8.1 ounces | 12 hours |

Specifications are measured per TIA 102.CAA-B, TIA 102.CAAB-B and per TIA 603-C.

All EFJohnson radios are made in the U.S.A.

ENVIRONMENTAL SPECIFICATIONS

| Environment | Mil Spec | 810F |
|-----------------|----------|--------|
| Low Pressure | M | P |
| High Temp. | 500.4 | II |
| Low Temp. | 501.4 | I, II |
| Temp. Shock | 502.4 | I, II |
| Solar Radiation | 503.4 | I |
| Rain/Blown Rain | 504.4 | I |
| Humidity | 506.4 | I, III |
| Salt Fog | 507.4 | NA |
| Dust and Sand | 509.4 | NA |
| Vibration | 510.4 | I |
| Shock | 514.5 | I(24) |
| Immersion* | 516.5 | I, IV |
| | 512.4 | I |

M=Method P=Procedure
Also meets equivalent superseded C, D, and
E standards
*Optional




ENCRYPTION OPTIONS

| | |
|--|---|
| Supported Encryption Algorithms | DES, DES-OFB, AES |
| Encryption Keys/Radio | 64 Common Key Reference (CKR) 64 Physical Identifier (PID) Compatible with Motorola Key Variable Loader |
| Encryption Frame Re-sync Interval | P25 CA1 360 msec |
| Encryption Keying | External Key Loader, OTAR |
| Synchronization | CFB — Cipher Feedback OFB — Output Feedback |
| Vector Generator | National Institute of Standards and Technology (NIST) approved random number generator |
| Encryption Type | Digital |
| Key Erasure | Keyboard Command |
| Code Key Initialization | Internal pseudorandom generator |
| Standards | FIPS 46-3, FIPS 81, FIPS 140-2, FIPS 197 |



FACTORY MUTUAL APPROVALS

| | | |
|---------------------------|--|---|
| Intrinsically Safe | | |
| Class I | Division 1: An area where there is or could be an explosive atmosphere most of the time in normal conditions. | C Ethylene D Propane and Methane E Conductive metal F Carbonaceous material coal, coke dust G Grain dust and flour |
| Class II | | |
| Class III | Division 1: Location in which easily ignitable fibers or materials producing combustible flyings are handled, manufactured, or used. | Ignitable fibers or flyings |
| Non-Incendive | | |
| Class I | Division 2: An area where an explosive atmosphere exists only as a result of a fault. | A Acetylene B Hydrogen C Ethylene D Propane and Methane |





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51SL ES Series Portable Radio

700/800 MHz • VHF • UHF

KEY FEATURES & BENEFITS

Future Proof

- ▶ The 51SL ES protects your investment with a TDMA upgradable solution

Reliable & Rugged

- ▶ Aluminum casting and polycarbonate housing provide exceptional strength in a light weight package
- ▶ Meets applicable Mil Standard 810C, D, E, and F specifications
- ▶ Approved by Factory Mutual as intrinsically safe for use in hazardous environments

Submersibility Option

- ▶ Immersible to a depth of 1 meter for 30 minutes (per MIL Spec 810F and IP67 standards)

Significant Product Flexibility

- ▶ Enables programming of up to 512 channel/talkgroups
- ▶ Supports both narrowband (12.5 kHz) and wideband (25 kHz) channel spacing, and multiple system protocols
- ▶ Supports MDC1200 and GE-Star Signaling

Simplified Configuration Updates & Option Selection

- ▶ Over the Air Programming (OTAP) option enables you to program radios without having to send them to a service shop, saving time and costs
- ▶ Easy radio programming and feature updating using EFJohnson's PC Configure™ software for portable and mobile radios

Extensive Accessory Suite

- ▶ Complete line of accessories including speaker microphones, headsets, surveillance kits, batteries, chargers, carrying apparatus, and encryption keyloading devices. Visit our website for the *EFJohnson Subscriber Accessories Catalog!*



Future-proof your radio investment.

The 51SL ES Portable Radio from EF Johnson Technologies provides a seamless evolution to next generation networks while offering investment protection for your present communications system, all in a powerful software-controlled device for first responders that is easy on your budget. The 51SL ES Series is packed with features normally found in radios costing thousands of dollars more. Specifically designed for public safety, the ES Series offers crisp and powerful digital audio with the AMBE+2 vocoder, Project 25 trunked and conventional operation, TDMA upgradable, and a sleek ergonomic design. Keep your fleet safe for the future – make the 51SL ES Series Portable Radio your right choice.

▶ Project 25 Compliance

Supports Project 25 CAI (Common Air Interface), Project 25 trunked and conventional system protocols, and Project 25 Over-the-Air Rekeying (OTAR) functionality.

▶ AMBE+2 Vocoder for Outstanding Voice Quality and Noise Reduction

Hear the Difference! EFJohnson is one of the only radio manufacturers with a full implementation of this second generation digital vocoder (AMBE+2), P25 preferred vocoder.

▶ SMARTNET® II / SmartZone® Interoperability

EFJohnson is the only supplier licensed to support both analog and digital SMARTNET II and SmartZone trunking protocols.

▶ Numerous Encryption Protocols

Supports industry-standard encryption capabilities such as AES, DES-OFB and DES. Ask about our free Single Key DES-OFB encryption for P25.

SMARTNET®



SmartZone®



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TECHNOLOGIES
We Respond.

www.efjohnsonstechnologies.com

51SL ES Series Portable Radio

700/800 MHz • VHF • UHF

Typical Performance Specifications

| GENERAL | 700/800 | VHF | UHF R1 | UHF R2 |
|-----------------------------------|--|---------------------------------------|---------------------------------------|---------------------------------------|
| Frequency Range | 762–806 MHz 806–870 MHz | 136–174 MHz | 380–470 MHz | 450–512 MHz |
| Channel Spacing | 12.5 kHz, 25 kHz | 12.5 kHz, 25 kHz | 12.5 kHz, 25 kHz | 12.5 kHz, 25 kHz |
| Maximum Frequency Separation | Full Bandsplit | Full Bandsplit | Full Bandsplit | Full Bandsplit |
| FCC Type Acceptance Certification | ATH2425171 | ATH2425111 | ATH2425131 | ATH2425141 |
| Canada Type Certification | IC: 933B-2425171 | IC: 933B-2425112 | IC: 933B-2425131 | IC: 933B-2425141 |
| FCC Emissions Designators | 11K0F3E, 16K0F3E, 14K0F3E, 8K10F1E, 8K10F1D | 16K0F3E, 11K0F3E, 8K10F1E, 8K10F1D | 16K0F3E, 11K0F3E, 8K10F1E, 8K10F1D | 16K0F3E, 11K0F3E, 8K10F1E, 8K10F1D |
| Input Voltage | 7.2 V | | | |
| Dimensions (w/o antenna) (HxWxD) | 6.7" x 2.52" x 1.8" (6.4 cm x 17.0 cm x 4.6 cm) | | | |
| Weight (without standard battery) | 11 oz. (312 g) | | | |
| Case | Polycarbonate—black Immersion rated option available for all housings | | | |
| Temperature Range | –30°C to +60°C | | | |
| Vocoder | Enhanced Full-Rate Digital Vocoder (AMBE+2) Project 25 | | | |

TRANSMITTER

| | | | | |
|--------------------------------------|---------------------------------------|----------|----------|----------|
| RF Power Output | 2.5/1 W (700 MHz), 3/1 W (800 MHz) | 5/1 W | 4/1 W | 4/1 W |
| Frequency Stability (–30°C to +60°C) | ±1.5 ppm | ±1.5 ppm | ±1.5 ppm | ±1.5 ppm |
| Modulation Limiting | | | | |
| 25 kHz channels | ±5 kHz | ±5 kHz | ±5 kHz | ±5 kHz |
| 12.5 kHz channels | ±2.5 kHz | ±2.5 kHz | ±2.5 kHz | ±2.5 kHz |
| Emissions (Conducted/Radiated) | –75 dBc | –75 dBc | –75 dBc | –75 dBc |
| Audio Response | +1, –3dB | +1, –3dB | +1, –3dB | +1, –3dB |
| FM Hum and Noise | | | | |
| 25 kHz channels | –40 dB | –45 dB | –45 dB | –45 dB |
| 12.5 kHz channels | –35 dB | –40 dB | –40 dB | –40 dB |
| Audio Distortion | 2% | 2% | 2% | 2% |

RECEIVER

| | | | | |
|--------------------------------------|--------------------|--------------------|--------------------|--------------------|
| Audio Output Power | 500 mW | 500 mW | 500 mW | 500 mW |
| Frequency Stability (–30°C to +60°C) | ±1.5 ppm | ±1.5 ppm | ±1.5 ppm | ±1.5 ppm |
| Selectivity | | | | |
| Analog Mode: 12 dB SINAD | 0.25 uV (–119 dBm) | 0.25 uV (–119 dBm) | 0.25 uV (–119 dBm) | 0.25 uV (–119 dBm) |
| Digital Mode: 5% BER | 0.25 uV (–119 dBm) | 0.25 uV (–119 dBm) | 0.25 uV (–119 dBm) | 0.25 uV (–119 dBm) |
| Intermodulation | –75 dB | –75 dB | –75 dB | –75 dB |
| Spurious & Image Rejection | –75 dB | –75 dB | –75 dB | –75 dB |
| FM Hum and Noise | | | | |
| 25 kHz channels | –40 dB | –40 dB | –40 dB | –40 dB |
| 12.5 kHz channels | –35 dB | –35 dB | –35 dB | –35 dB |
| Audio Distortion | 2% | 2% | 2% | 2% |

BATTERIES

| Battery Type | Dimensions (HxWxD) | Weight | Approx. Life (5/5/90) |
|------------------------------|--------------------|------------------------------|--|
| Extra-High Capacity NiMH | 6.0 x 2.3 x 0.85 | 12.96 ounces | UHF/VHF: Minimum 10 hours 700/800 MHz: Minimum 12 hours |
| Extra-High Capacity NiMH, IS | 6.0 x 2.3 x 0.85 | 12.96 ounces | UHF/VHF: Minimum 10 hours 700/800 MHz: Minimum 12 hours |
| Alkaline Battery Clamshell | 7.2 x 2.6 x 2.0 | 15.68 ounces (w/12 AA batt.) | 14–16 hours |
| High Capacity Lithium Ion | 6.5 x 2.3 x .78 | 8.1 ounces | 12 hours |

Specifications are measured per TIA 102.CAA-B, TIA 102.CAAB-B and per TIA 603-C.

All EFJohnson radios are made in the U.S.A.

ENVIRONMENTAL SPECIFICATIONS

| Environment | Mil Spec | 810F |
|-----------------|----------|--------|
| Low Pressure | M | P |
| High Temp. | 500.4 | II |
| Low Temp. | 501.4 | I, II |
| Temp. Shock | 502.4 | I, II |
| Solar Radiation | 503.4 | I |
| Rain/Blown Rain | 505.4 | I |
| Humidity | 506.4 | I, III |
| Salt Fog | 507.4 | NA |
| Dust and Sand | 509.4 | NA |
| Vibration | 510.4 | I |
| Shock | 514.5 | I(24) |
| Immersion* | 516.5 | I, IV |
| | 512.4 | I |

M=Method P=Procedure
Also meets equivalent
superseded C, D, and
E standards
*Optional



ENCRYPTION OPTIONS

| | |
|-----------------------------------|---|
| Supported Encryption Algorithms | AES, DES, DES-OFB |
| Encryption Keys/Radio | 64 Common Key Reference (CKR) 64 Physical Identifier (PID) Compatible with Motorola Key Variable Loader |
| Encryption Frame Re-sync Interval | P25 CAI 360 msec |
| Encryption Keying | External Key Loader, OTAR |
| Synchronization | CFB – Cipher Feedback OFB – Output Feedback |
| Vector Generator | National Institute of Standards and Technology (NIST) approved random number generator |
| Encryption Type | Digital |
| Key Erasure | Keyboard Command |
| Code Key Initialization | Internal pseudorandom generator |
| Standards | FIPS 46–3, FIPS 81, FIPS 140–2, FIPS 197 |



FACTORY MUTUAL APPROVALS

| | |
|--------------------|---|
| Intrinsically Safe | |
| Class I | Division 1 An area where there is or could be an explosive atmosphere most of the time in normal conditions. |
| Class II | |
| Class III | Division 1 Location in which easily ignitable fibers or materials producing combustible flyings are handled, manufactured, or used. |
| Non-Incendive | |
| Class I | Division 2 An area where an explosive atmosphere exists only as a result of a fault. |



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Subscriber Management Assistant (SMA)

KEY FEATURES & BENEFITS

- ▶ Minimize your learning curve with an intuitive graphical interface
- ▶ Erase all keys from a radio
- ▶ Retrieve hardware revision information from the radio
- ▶ Select a key set and make that key set active, modify and set KEK parameters, set KMF parameters on the radio, and set or modify RSI parameters
- ▶ Create a new database containing security parameters such as AES and DES keys
- ▶ Delete or modify an existing database containing security parameters such as AES and DES keys
- ▶ Encrypt all keys stored in the SQL CE using a 256-bit AES key
- ▶ SMA package includes case and adapter cable



The EFJohnson Subscriber Management Assistant (SMA) is a versatile tool, but its predominant function is for fast and easy encryption key loading. Since the SMA uses PDA technology in a ruggedized case, it can be used in almost any environment. The SMA connects to an EFJohnson radio via a serial interface. All configuration and modifications are completed through the serial interface. It uses the FIPS validated SEM security algorithms for all security functions, including AES and DES. With its Microsoft Windows® based graphical user interface, the SMA will have you configuring your radios right away.

The SMA enables you to:

- ▶ Generate a random DES Key or AES Keys for download to EFJohnson portable radios in CKR mode
- ▶ Enter your own AES or DES key for download into a portable radio
- ▶ Use the Microsoft SQL CE database for storage of security parameters such as AES and DES keys

Connect to radios

For keyloading functionality, the SMA connects to radios via a special keyloader cable.



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Subscriber Management Assistant (SMA)

Typical Performance Specifications

SYSTEM FEATURES

| | |
|------------------|---|
| Device | HP iPAQ hx2490 Pocket PC |
| Operating System | Microsoft® Windows Mobile™ 5.0 for Pocket PC, Premium Edition |
| Processor | Intel® PXA270 Processor 520 MHz |

MEMORY

| | |
|------------------|-------------|
| Available Memory | 64 MB SDRAM |
| Flash Memory | 512 MB |

AUDIO, SLOTS, AND PORTS

| | |
|-------|---|
| Ports | 1 Serial 1 USB 1 IrDA 1 Interfaces |
| Slots | 1 Type II 1 Support 1-bit SDIO and 4-bit SD/MMC type memory standard |

GRAPHICS AND INPUT/OUTPUT DEVICES

| | |
|---------------|---|
| Input Devices | Touch-sensitive display for stylus or fingertip |
|---------------|---|

SOFTWARE

| | |
|-------------------------|---|
| Pre-Installed Software | Outlook 2002, Microsoft ActiveSync, Microsoft Reader eBooks |
| Software Included (ROM) | ActiveSync, Adobe Reader for PC, ClearVUE Suite (Word and Excel, PPT and PDF), Outlook 2002 Desktop, WorldMate and Media Player Desktop |
| Key Management Software | EFJohnson Key Set Creation and Management Application |

MANAGEABILITY

| | |
|---------------------|---|
| Security Management | HP ProtectTools secured by CREDANT Technologies |
|---------------------|---|

PRODUCT SPECIFICATIONS

| | |
|------------------------|--|
| Dimensions (h x w x d) | 4.71 x 3.01 x 0.65 in (119.4 x 76.6 x 16.3 mm) |
| Weight | 5.8 oz (164.4 g) |

ACCESSORIES INCLUDED

| | |
|-------|---|
| Case | Lightweight, aircraft-grade aluminum case precisely molded to fit the SMA with neoprene lining to protect against drops |
| Cable | Adapter cable to connect to EFJohnson radio programming cables Additional cable required for programming |

PC Configure™ Programming Software

KEY FEATURES & BENEFITS

- ▶ Minimize your learning curve with an intuitive graphical interface
- ▶ Configure mobile and portable radios with a single software package
- ▶ Switch between radio and system parameters, and program zone and channel properties with the click of a mouse
- ▶ Program your radios in analog conventional, Multi-Net®, Project 25 conventional and trunking, and SMARTNET®/SmartZone®
- ▶ Use one template to program multiple radios – simply change unit IDs and download the file to each radio

Computer Requirements:

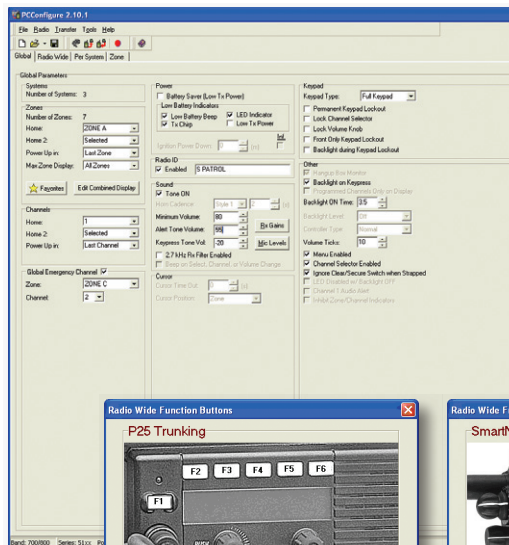
- 800 MHz Pentium or greater
- 128 MB RAM
- 40 MB hard disk space
- CD-ROM drive

The portability of the software lets you program your radios anywhere.

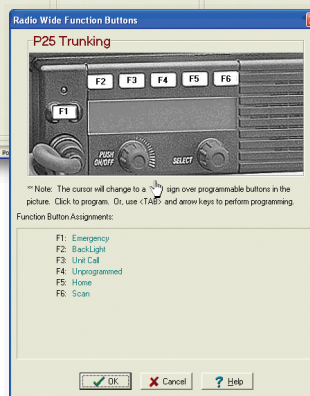


EFJohnson's PC Configure™ software is the most user-friendly programming software for public safety and service radio users. Program all of your EFJohnson mobile and portable radios quickly and easily with the same software package. With minimal setup time or training, PC Configure gives you the flexibility to program your EFJohnson portable or mobile radios for any encryption or system type installed on the radio. PC Configure is a Windows®-based application. With its intuitive and unique graphical display, PC Configure allows you to re-reflash radios much faster than any other radio programming software. PC Configure's "remember" function stores previously programmed parameters (such as software version or options) and recalls them for future use.

Manage encryption keys, channels, zones, and other vital radio functions - all from your PC.



Simplify radio programming with a click of a mouse.



Form S554 8/10 (Supersedes 3/09) Printed in U.S.A.

Specifications subject to change without notice.

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Windows is a registered trademark of Microsoft Corp.

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SMARTNET®



SmartZone®



EFJohnson
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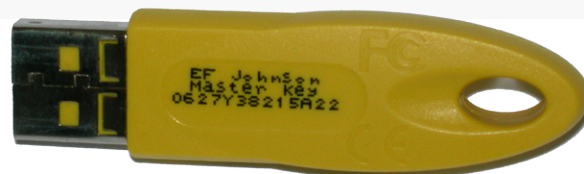
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Enhanced System Key™ (ESK)

KEY FEATURES & BENEFITS

- ▶ EFJohnson subscriber radios and the ESK functionality are fully compatible with SMARTNET® II / SmartZone®, and Project 25 Trunked and Conventional systems
- ▶ Enables a single programming file to contain up to 4 systems, i.e. 2 SMARTNET, 1 SmartZone, and 1 P25 Trunked system — each with their own unique restrictions
- ▶ Manage your programming keys in a very efficient and secure method
- ▶ Delegate authority to allow groups to program only what they should be authorized to program using EFJohnson's Slave Key



Protect your radio programming authorizations with the EFJohnson Enhanced System Key™ (ESK). Based on the SafeNet Sentinel Ultra ProUSB Dongle, data is protected with AES encryption algorithms – providing extra security when distributing EFJohnson Enhanced ESKs throughout your organization. It can support up to four EFJohnson System Keys.

The Enhanced ESK communicates with EFJohnson's PC Configure™ Version 2.1.0 software when connected to a computer's USB port, enabling authorized users to program radios according to specified system key information.

With two ESK versions – a Master System Key and a Slave System Key – to accommodate your security needs, each is user-friendly and customizable.

Master System Key (MSK)

This hardware version of the ESK provides full access to all PC Configure features. Program up to 4 System Keys into the MSK, and up to 3 Unit ID ranges and 5 Talk Group ID ranges from each of these System Keys.

Slave System Key (SSK)

Limit access to system key functionality to your selected ranges of Unit IDs and Talk Group IDs from the MSK. Track issued SSKs throughout your agencies by assigning a serial number. Enter an expiration date for added security.

Form S741 8/10 (Supersedes 12/08) Printed in U.S.A.
Specifications subject to change without notice.

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BENELEC

Professional Wireless Solutions



Mobile Radios

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5300 ES Series Mobile Radio

7/800 MHz • UHF • VHF

2008 **HOT** PRODUCT

KEY FEATURES & BENEFITS

Future Proof

- ▶ The 5300 ES protects your investment with a TDMA upgradable solution

Robust & Flexible

- ▶ Up to 864 Channels / Talkgroups
- ▶ SMARTNET II®/SmartZone® P25 Digital & Analog
- ▶ All Supported Protocols Available Simultaneously
- ▶ DES, DES-OFB, & AES Encryption with 64 keys
- ▶ P25 Conventional & Trunked OTAR
- ▶ Conventional Vote Scan is Standard
- ▶ Supports MDC1200 and GE-Star Signaling
- ▶ Compatible with Motorola Astro®
- ▶ Supports Motorola® System v7.7
- ▶ Simplified cabling with a single multi-function accessory connection in the rear

Trunking

- ▶ SMARTNET II / SmartZone
- ▶ P25

Data & Control Interfaces

- ▶ Supports P25 Conventional IP Packet Data
- ▶ Supports GPS AVL Data

Simplified Configuration Updates & Option Selection

- ▶ Over the Air Programming (OTAP) option enables you to program radios without having to send them to a service shop, saving time and costs
- ▶ Easy radio programming and feature updating using EFJohnson's PC Configure™ software for portable and mobile radios

Multiple Configuration Options

- ▶ Dash Mount
- ▶ Remote Mount
- ▶ Dash Mount with Remote Control Head
- ▶ Dual Remote Control Heads
- ▶ Hand-Held Controller
- ▶ Internal or External Speaker
- ▶ Fixed Control Stations

Extensive Accessory Suite

- ▶ Complete line of accessories including microphones, speakers, and encryption keyloading devices. Visit our website for the EFJohnson Subscriber Accessories Catalog!



P25, SMARTNET®/SmartZone®, and TDMA in one radio!

The award-winning 5300 ES Series Mobile Radios from EFJohnson Technologies meets the needs of first responders with a powerful mobile radio that protects your investment for years to come. Seamless interoperability with analog and digital, wideband and narrowband, best-in-class digital audio with the Enhanced (AMBE+2) Project 25 Vocoder, and a wide variety of trunking protocols – all available simultaneously in the same radio – makes the 5300 ES ideal for migrating critical systems to the latest open standards. This flexibility helps protect your investment in the future as well as maximizes interoperability among most installed systems. If you need a multi-protocol mobile radio that leads the industry in feature richness and system interoperability, then the 5300 ES Series Mobile Radio is the right choice.

▶ Project 25 Compliance

Supports Project 25 CAI (Common Air Interface), Project 25 trunked and conventional system protocols, and Project 25 Over-the-Air Rekeying (OTAR) functionality.

▶ AMBE+2 Vocoder for Outstanding Voice Quality and Noise Reduction

Hear the Difference! EFJohnson is one of the only radio manufacturers with a full implementation of this second generation digital vocoder (AMBE+2), P25 preferred vocoder.

▶ SMARTNET® II / SmartZone® Interoperability

EFJohnson is the only supplier licensed to support both analog and digital SMARTNET II and SmartZone trunking protocols.

▶ Numerous Encryption Protocols

Supports industry-standard encryption capabilities such as AES, DES-OFB and DES. Ask about our free Single Key DES-OFB encryption for P25.

SMARTNET®



SmartZone®



EFJohnson
TECHNOLOGIES
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5300 ES Series Mobile Radio

700/800 MHz UHF VHF

Typical Performance Specifications

| GENERAL | 7/800, 30/35W | UHF R1, 40W | VHF |
|---|---|------------------------------|------------------------------|
| Frequency Range (band splits) | 762-806 MHz 806-870 MHz | 380-470 MHz | 136 - 174 MHz |
| Channel Spacing | | | |
| Analog | 25kHz, 12.5kHz | 25kHz, 12.5kHz | 25 kHz, 12.5 kHz |
| P25 Digital | 12.5kHz | 12.5kHz | 12.5 kHz |
| Maximum Frequency Separation | Full Bandsplit | Full Bandsplit | Full Bandsplit |
| Display | Backlit LCD. 10 alpha-numeric characters plus Zone, Channel and Status. Electronically adjustable viewing angle | | |
| Power Supply | | | |
| Nominal Voltage (negative ground) | 13.6VDC | 13.6VDC | 13.6VDC |
| Operating Supply Voltage Range | 10.9 ~ 16.3 VDC | 10.9 ~ 16.3 VDC | 10.9 ~ 16.3 VDC |
| Standby Current (back-light off) | 700 mA | 400 mA | 400 mA |
| Standby Current (Lightning™ Control Head) | 900 mA | 700 mA | 700 mA |
| Receive Current at Rated Audio Power | 2.65A | 2.65A | 2.65A |
| Receive Current at Rated Audio Power (Lightning) | 2.85A | 2.85A | 2.85A |
| Current at Max Rated Transmit Power | 12.5A | 10A | 12.5A |
| Temperature Range | | | |
| Operating | -30°C to +60°C | -30°C to +60°C | -30°C to +60°C |
| Storage | -40°C to +85°C | -40°C to +85°C | -40°C to +85°C |
| Nominal Dimensions (H x W x D) | 2.1" x 7.2" x 8.3" | 2.1" x 7.2" x 8.3" | 2.1" x 7.2" x 8.3" |
| exclusive of mounting, cables, knobs | (5.3 cm x 18.2 cm x 21.1 cm) | (5.3 cm x 18.2 cm x 21.1 cm) | (5.3 cm x 18.2 cm x 21.1 cm) |
| Nominal Weight | 6.5 lbs (2.3 kg) | 6.5 lbs (2.3 kg) | 6.5 lbs (2.3 kg) |
| FCC ID | ATH2425372 | ATH2425333 | ATH2425313 |
| Industry Canada | IC: 933B-2425372 | IC: 933B-2425333 | IC: 933B-2425313 |
| Vocoder | Enhanced Full-Rate Digital Vocoder (AMBE+2) Project 25 | | |
| TRANSMITTER | | | |
| RF Output Power (variable) | 15 ~ 30 W (762-806MHz) 15 ~ 35 W (806-870MHz) | 10W ~ 40 W | 15W ~ 50 W |
| Transmitter Frequency Range(s) | 762~776, 792~806, 806~825, 851~870 MHz | 380 ~ 470 MHz | 136 ~174 MHz |
| Maximum Frequency Separation | Full Band Split | Full Band Split | Full Band Split |
| Frequency Accuracy (-30°C ~ +80°C, +25°C ref.) | ±1.5 ppm | ±1.5 ppm | ±1.5 ppm |
| Modulation Limiting | | | |
| 25kHz channels | ±5 kHz | ±5 kHz | ±5 kHz |
| 12.5kHz channels | ±2.5 kHz | ±2.5 kHz | ±2.5 kHz |
| Modulation Fidelity | | | |
| (C4FM, 12.5kHz Digital) | < 5% | < 5% | < 5% |
| Spurious Emissions | -75 dBc | -75 dBc | -75 dBc |
| Audio | | | |
| Analog Frequency Response (TIA 6dB/octive pre-emphasis) | +1dB, -3dB | +1dB, -3dB | +1dB, -3dB |
| FM Hum and Noise Ratio (25kHz Analog) | 40 dB | 45 dB | 45 dB |
| FM Hum and Noise Ratio (12.5kHz Analog) | 34 dB | 39 dB | 39 dB |
| Distortion | 2% | 2% | 2% |
| FCC Emission Designators 8K10F1D, 8K10F1E, 11K0F3E, 16K0F3E8K10F1D, 8K10F1E, 11K0F3E, 16K0F3E | | | |
| RECEIVER | | | |
| Receiver Frequency Ranges | 762~776, 851~870 MHz | 380 ~ 470 MHz | 136 - 174 MHz |
| Maximum Frequency Separation | Full Bandsplit | Full Bandsplit | Full Bandsplit |
| Sensitivity | | | |
| Analog Mode: 12dB SINAD (25 & 12.5kHz) | .25µV (-119 dBm) | .25µV (-119 dBm) | .25µV (-119 dBm) |
| Digital Mode: (5% BER) .25µV (-119 dBm) | .25µV (-119 dBm) | .25µV (-119 dBm) | |
| Selectivity (Adjacent Channel Rejection) | | | |
| 25kHz channels, Analog > 80 dB | >75 dB | >75 dB | |
| 12.5kHz channels | > 63 dB | > 63 dB | > 63 dB |
| Offset, Digital | < 9 dB / kHz | < 9 dB / kHz | < 9 dB / kHz |
| Intermodulation | -80 dB | -75 dB | -75 dB |
| Spurious Response Rejection | -83dB | -75 dB | -75 dB |
| Audio | | | |
| Analog Frequency Response (TIA 6dB/octave pre-emphasis) | +1dB, -3dB | +1dB, -3dB | +1dB, -3dB |
| Output Power (3Ω load) 12W rms | 12W rms | 12W rms | |
| Distortion (1kHz, 60% Deviation) | < 3% | < 3% | < 3% |

ENVIRONMENTAL SPECIFICATIONS

| Environment | Mil Spec M | 810G P |
|-----------------|------------|--------------|
| Low Pressure | 500.5 | II |
| High Temp. | 501.5 | I, II |
| Low Temp. | 502.5 | I, II |
| Temp. Shock | 503.5 | I (D) |
| Solar Radiation | 505.5 | I (A1) |
| Rain/Blown Rain | 506.5 | I, III |
| Humidity | 507.5 | -- |
| Salt Fog | 509.5 | -- |
| Sand and Dust | 510.5 | I, II |
| Vibration | 514.6 | I (4), II |
| Shock | 516.6 | I, II, V, VI |

M = Method P = Procedure
Also meets equivalent superseded C, D, and E standards

ENCRYPTION OPTIONS

| | |
|--|---|
| Supported Encryption Algorithms | DES, DES-OFB, AES |
| Encryption Keys/Radio | 64 Common Key Reference (CKR) 64 Physical Identifier (PID) Compatible with Motorola Key Variable Loader |
| Encryption Frame Re-sync Interval | P25 CAI 360 msec |
| Encryption Keying | External Key Loader, OTAR |
| Synchronization | CFB — Cipher Feedback OFB — Output Feedback |
| Vector Generator | National Institute of Standards and Technology (NIST) approved random number generator |
| Encryption Type | Digital |
| Key Erasure | Keyboard Command |
| Code Key Initialization | Internal pseudorandom generator |
| Standards | FIPS 46-3, FIPS 81, FIPS 140-2, FIPS 197 |



ACCESSORIES

- Antennas
- Keypad Microphones
- Desk Microphones
- Hand-Held Controller
- Remote Control Heads
- External Speakers
- Power Supplies
- Control Station Components
- Tone Remotes
- Encryption Key Management Tools
- Radio Programming Tools
- Mounting Hardware
- Siren Control Kit

All EFJohnson radios are made in the U.S.A.



BENELEC Pty Ltd

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Mascot NSW 2020

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Lightning™ Control Head

for ES Series Mobile Radios

KEY FEATURES & BENEFITS

Large Electroluminescent Display

- ▶ Display resolution: 320 x 80 pixels
- ▶ Supports PC-programmable display modes:
 - Display Mode 1: one icon line, one alphanumeric text line with 10 characters plus zone and channel, and one softkey line
 - Display Mode 2: one icon line, two alphanumeric text lines with 10 characters each plus zone and channel, and one softkey line
 - Display Mode 3: one icon line, one alphanumeric text line with 16 characters, and one softkey line
 - Display Mode 4: one icon line, two alphanumeric text lines with 16 characters each, and one softkey line
- ▶ Halo Transmit/Receive Indicator changes color when in Transmit or Receive mode
- ▶ Viewing angle > 160°
- ▶ High brightness and contrast
- ▶ Long operating life resists fading
- ▶ 200G shock durability
- ▶ Emissive pixel technology makes small text more legible

Versatility

- ▶ For use with ES Series (5300 ES, 53SL ES, and Ascend™ Mobile ES) Project 25 compliant trunked and conventional mobile radios
- ▶ Extended temperature range
- ▶ 3-Level brightness control
- ▶ Navigation key
- ▶ Dedicated and protected emergency button



See the Difference...

The new Lightning™ Control Head (Patent Pending) from EF Johnson Technologies has the brightest and clearest display on the market today, and is the perfect complement to our award-winning ES Series Mobile Radio. The control head can be clearly seen from anywhere in your vehicle.

This new control head uses the same display technology found in military applications such as airborne cockpit and ground-based vehicle dashboard instrumentation, windshield heads-up display, military weaponry and communication equipment. Choose the Lightning Control Head and change the way you look at mobile radios.

Form S851 5/10 (Supercades 2/10) Printed in U.S.A.
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SMARTNET®



SmartZone®



EFJohnson
TECHNOLOGIES
We Respond.

www.efjohnsontechnologies.com

53SL ES series Mobile Radio

7/800 MHz • UHF • VHF

KEY FEATURES & BENEFITS

Future Proof

- ▶ The 53SL ES protects your investment with a TDMA upgradable solution

Robust & Flexible

- ▶ Up to 512 Channels / Talkgroups
- ▶ P25 Digital and Analog
- ▶ SMARTNET II®/SmartZone® P25 Digital & Analog
- ▶ All Supported Protocols Available Simultaneously
- ▶ DES & DES-OFB Encryption with 64 keys
- ▶ P25 Conventional & Trunked OTAR
- ▶ Conventional Vote Scan is Standard
- ▶ Supports MDC1200 and GE-Star Signaling
- ▶ Compatible with Motorola Astro®
- ▶ Supports Motorola® System v7.7
- ▶ Simplified cabling with a single multi-function accessory connection in the rear

Data & Control Interfaces

- ▶ Supports P25 Conventional IP Packet Data
- ▶ Supports GPS AVL Data

Simplified Configuration Updates & Option Selection

- ▶ Over the Air Programming (OTAP) option enables you to program radios without having to send them to a service shop, saving time and costs
- ▶ Easy radio programming and feature updating using EFJohnson's PC Configure™ software for portable and mobile radios

Multiple Configuration Options

- ▶ Dash Mount
- ▶ Remote Mount
- ▶ Dash Mount with Remote Control Head
- ▶ Dual Remote Control Heads
- ▶ Hand-Held Controller
- ▶ Internal or External Speaker
- ▶ Fixed Control Stations

Extensive Accessory Suite

- ▶ Complete line of accessories including microphones, speakers, and encryption keyloading devices. Visit our website for the EFJohnson Subscriber Accessories Catalog!



Future-proof your radio investment.

The 53SL ES Mobile Radio from EF Johnson Technologies provides a seamless evolution to next generation networks while offering investment protection for your present communications system, all in a powerful software-controlled device that is easy on your budget. The 53SL ES Series is packed with features normally found in radios costing thousands of dollars more. Specifically designed for public safety, the 53SL ES Series offers crisp and powerful digital audio with the Enhanced Full-Rate Digital Vocoder (AMBE+2), Project 25 trunked and conventional operation, TDMA upgradable, and a simplified cable design. Keep your fleet safe for the future. Make the 53SL ES Series Mobile Radio your right choice.

▶ Project 25 Compliance

Supports Project 25 CAI (Common Air Interface), Project 25 trunked and conventional system protocols, and Project 25 Over-the-Air Rekeying (OTAR) functionality.

▶ AMBE+2 Vocoder for Outstanding Voice Quality and Noise Reduction

Hear the Difference! EFJohnson is one of the only radio manufacturers with a full implementation of this second generation digital vocoder (AMBE+2), P25 preferred vocoder.

▶ SMARTNET® II / SmartZone® Interoperability

EFJohnson is the only supplier licensed to support both analog and digital SMARTNET II and SmartZone trunking protocols.

▶ Numerous Encryption Protocols

Supports industry-standard encryption capabilities such as AES, DES-OFB and DES. Ask about our free Single Key DES-OFB encryption for P25.

SMARTNET®



SmartZone®



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TECHNOLOGIES
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53SL ES Series Mobile Radio

700/800 MHz • VHF • UHF

Typical Performance Specifications

| GENERAL | 7/800, 30/35W | UHF R1, 40W | VHF |
|--|---|------------------------------|------------------------------|
| Frequency Range (band splits) | 762-806 MHz 806-870 MHz | 380-470 MHz | 136 - 174 MHz |
| Channel Spacing | | | |
| Analog | 25kHz, 12.5kHz | 25kHz, 12.5kHz | 25 kHz, 12.5 kHz |
| P25 Digital | 12.5kHz | 12.5kHz | 12.5 kHz |
| Maximum Frequency Separation | Full Band Split | Full Band Split | Full Band Split |
| Display | Backlit LCD. 10 alpha-numeric characters plus Zone, Channel and Status. Electronically adjustable viewing angle | | |
| Power Supply | | | |
| Nominal Voltage (negative ground) | 13.6VDC | 13.6VDC | 13.6VDC |
| Operating Supply Voltage Range | 10.9 ~ 16.3 VDC | 10.9 ~ 16.3 VDC | 10.9 ~ 16.3 VDC |
| Standby Current (back-light off) | 700 mA | 400 mA | 400 mA |
| Standby Current (Lightning™ Control Head) | 900 mA | 700 mA | 700 mA |
| Receive Current at Rated Audio Power | 2.65A | 2.65A | 2.65A |
| Receive Current at Rated Audio Power (Lightning) | 2.85A | 2.85A | 2.85A |
| Current at Max Rated Transmit Power | 12.5A | 10A | 12.5A |
| Temperature Range | | | |
| Operating | -30°C to +60°C | -30°C to +60°C | -30°C to +60°C |
| Storage | -40°C to +85°C | -40°C to +85°C | -40°C to +85°C |
| Nominal Dimensions (H x W x D) | 2.1" x 7.2" x 8.3" | 2.1" x 7.2" x 8.3" | 2.1" x 7.2" x 8.3" |
| exclusive of mounting, cables, knobs | (5.3 cm x 18.2 cm x 21.1 cm) | (5.3 cm x 18.2 cm x 21.1 cm) | (5.3 cm x 18.2 cm x 21.1 cm) |
| Nominal Weight | 6.5 lbs (2.3 kg) | 6.5 lbs (2.3 kg) | 6.5 lbs (2.3 kg) |
| FCC ID | ATH2425372 | ATH2425333 | ATH2425313 |
| Industry Canada | IC: 933B-2425372 | IC: 933B-2425333 | IC: 933B-2425313 |
| Vocoder | Enhanced Full-Rate Digital Vocoder (AMBE+2) Project 25 | | |

TRANSMITTER

| | | | |
|--|--|--------------------------------------|-----------------|
| RF Output Power (variable) | 15 ~ 30 W (762-806MHz) | 10W ~ 40 W 15 ~ 35 W (806-870MHz) | 15W ~ 50 W |
| Transmitter Frequency Range(s) | 762~776, 792~806, 806~825, 851~870 MHz | 380 ~ 470 MHz | 136 ~ 174 MHz |
| Maximum Frequency Separation | Full Band Split | Full Band Split | Full Band Split |
| Frequency Accuracy (-30°C ~ +80°C, +25°C ref.) | ±1.5 ppm | ±1.5 ppm | ±1.5 ppm |
| Modulation Limiting | | | |
| 25kHz channels | ±5 kHz | ±5 kHz | ±5 kHz |
| 12.5kHz channels | ±2.5 kHz | ±2.5 kHz | ±2.5 kHz |
| Modulation Fidelity (C4FM, 12.5kHz Digital) | < 5% | < 5% | < 5% |
| Spurious Emissions | -75 dBc | -75 dBc | -75 dBc |
| Audio | | | |
| Analog Frequency Response (TIA 6dB/octave pre-emphasis) | +1dB, -3dB | +1dB, -3dB | +1dB, -3dB |
| FM Hum and Noise Ratio (25kHz Analog) | 40 dB | 45 dB | 45 dB |
| FM Hum and Noise Ratio (12.5kHz Analog) | 34 dB | 39 dB | 39 dB |
| Distortion | 2% | 2% | 2% |
| FCC Emission Designators | 8K10F1D, 8K10F1E, 11K0F3E, 16K0F3E8K10F1D, 8K10F1E, 11K0F3E, 16K0F3E | | |

RECEIVER

| | | | |
|--|----------------------|------------------|------------------|
| Receiver Frequency Ranges | 762~776, 851~870 MHz | 380 ~ 470 MHz | 136 - 174 MHz |
| Maximum Frequency Separation | Full Band Split | Full Band Split | Full Band Split |
| Sensitivity | | | |
| Analog Mode: 12dB SINAD (25 & 12.5kHz) | .25µV (-119 dBm) | .25µV (-119 dBm) | .25µV (-119 dBm) |
| Digital Mode: (5% BER) | .25µV (-119 dBm) | .25µV (-119 dBm) | .25µV (-119 dBm) |
| Selectivity (Adjacent Channel Rejection) | | | |
| 25kHz channels, Analog | > 80 dB | > 75 dB | > 75 dB |
| 12.5kHz channels | | > 63 dB | > 63 dB |
| Offset, Digital | | < 9 dB / kHz | < 9 dB / kHz |
| Intermodulation | -80 dB | -75 dB | -75 dB |
| Spurious Response Rejection -83dB | -75 dB | -75 dB | -75 dB |
| Audio | | | |
| Analog Frequency Response (TIA 6dB/octave pre-emphasis) | +1dB, -3dB | +1dB, -3dB | +1dB, -3dB |
| Output Power (3Ω load) | 12W rms | 12W rms | 12W rms |
| Distortion (1kHz, 60% Deviation) | < 3% | < 3% | < 3% |

ENVIRONMENTAL SPECIFICATIONS

| Environment | Mil Spec M | 810G P |
|-----------------|---------------|--------------|
| Low Pressure | 500.5 | II |
| High Temp. | 501.5 | I, II |
| Low Temp. | 502.5 | I, II |
| Temp. Shock | 503.5 | I (D) |
| Solar Radiation | 505.5 | I (A1) |
| Rain/Blown Rain | 506.5 | I, III |
| Humidity | 507.5 | -- |
| Salt Fog | 509.5 | -- |
| Sand and Dust | 510.5 | I, II |
| Vibration | 514.6 | I (4), II |
| Shock | 516.6 | I, II, V, VI |

M = Method P = Procedure

Also meets equivalent superseded C, D, and E standards

ENCRYPTION OPTIONS

| | |
|--|---|
| Supported Encryption Algorithms | AES, DES, DES-OFB |
| Encryption Keys/Radio | 64 Common Key Reference (CKR) 64 Physical Identifier (PID) Compatible with Motorola Key Variable Loader |
| Encryption Frame Re-sync Interval | P25 CAI 360 msec |
| Encryption Keying | External Key Loader, OTAR |
| Synchronization | CFB – Cipher Feedback OFB – Output Feedback |
| Vector Generator | National Institute of Standards and Technology (NIST) approved random number generator |
| Encryption Type | Digital |
| Key Erasure | Keyboard Command |
| Code Key Initialization | Internal pseudorandom generator |
| Standards | FIPS 46-3, FIPS 81, FIPS 140-2, FIPS 197 |



ACCESSORIES

- Antennas
- Keypad Microphones
- Desk Microphones
- Hand-Held Controller
- Remote Control Heads
- External Speakers
- Power Supplies
- Control Station Components
- Tone Remotes
- Encryption Key Management Tools
- Radio Programming Tools
- Mounting Hardware
- Siren Control Kit

All EFJohnson radios are made in the U.S.A.



BENELEC Pty Ltd

Unit 2 / 581-587 Gardeners Rd

Mascot NSW 2020

T: 02 9364 7000 F: 02 9364 7099

Mobile Radio Hand-Held Controller

700/800 MHz • VHF • UHF

KEY FEATURES & BENEFITS

Reliable & Rugged

- ▶ Dedicated encryption on/off button (top — not shown)
- ▶ Numeric Keypad
- ▶ Highly flexible mounting locations for convenience or privacy
- ▶ HHC can be used anywhere with or without mounting
- ▶ Line-level transmit and receive audio via interface box
- ▶ Radio programming and encryption key loading via interface box
- ▶ Compatible with subscriber programming and encryption tools with adapter
- ▶ External speaker jack in interface box
- ▶ All display functions of the 5300 Series control head
- ▶ All six programmable function buttons of the 5300 Series control head
- ▶ Adjustable display and keypad backlighting (including "off")
- ▶ Multi-function LED indicator
- ▶ Volume up/down rocker control
- ▶ Channel/zone selection rocker control

The Hand-Held Controller (HHC) is a full-featured, discreet, and convenient alternative to traditional EFJohnson mobile radio control heads. Designed primarily for law enforcement, surveillance, and executive applications, the HHC provides full radio functionality in the palm of your hand. The HHC is available as a factory option or field-installed upgrade for any remote-control-head 5300 series or Ascend mobile for all frequency bands, power levels, and software options.



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Handheld Controller Controls

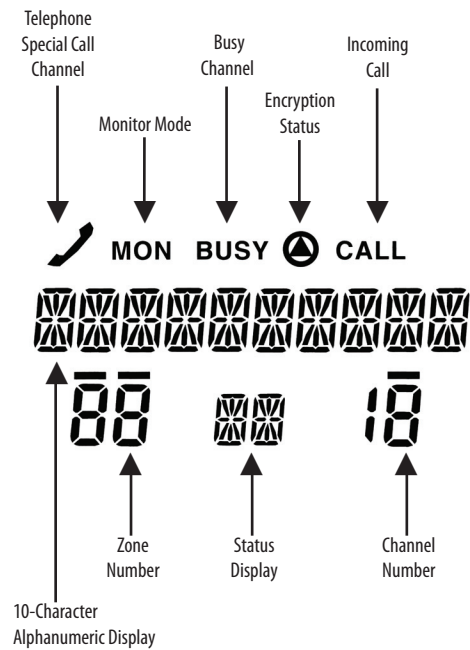


Handheld Controller shown with 5326 100-watt trunk-mount mobile and junction box. External speaker (PN 250-0151-005), also shown, is ordered separately.



HHC Hit 250-5300-101

LCD



ORDERING INFORMATION

To order with the mobile radio from the factory:

- Select "Remote-Mount Option" No. 5 at time of radio order (Does not include required external speaker.)
- 250-0151-005 5" Environmentally sealed speaker with plug compatible with HHC interface junction box. (Except for phone plug, this speaker is identical to the EFJ standard speaker, 250-0151-006, which has unterminated wires.)

To order as field upgrade:

- Ensure that existing mobile has connection for remote-control head (or has already been used with remote control head).
- 250-5300-101 Field installation HHC Kit includes HHC, interface junction box, 17' radio cable. (Does not include required external speaker.)
- 250-0151-005 5" Environmentally sealed speaker with plug compatible with HHC interface junction box. (Except for phone plug, this speaker is identical to the EFJ standard speaker, 250-0151-006, which has unterminated wires.)

Related Optional Accessories

- 597-2002-267 17' HHC to Radio cable. (Included in HHC Kit). Usually needed only for spares or re-installations
- 023-5300-140 Adapter required to connect radio programming kit cable to HHC interface junction box.

PC Configure™ Programming Software

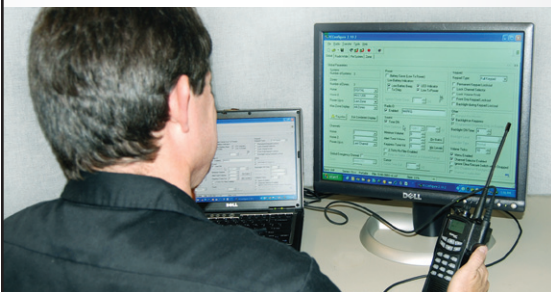
KEY FEATURES & BENEFITS

- ▶ Minimize your learning curve with an intuitive graphical interface
- ▶ Configure mobile and portable radios with a single software package
- ▶ Switch between radio and system parameters, and program zone and channel properties with the click of a mouse
- ▶ Program your radios in analog conventional, Multi-Net®, Project 25 conventional and trunking, and SMARTNET®/SmartZone®
- ▶ Use one template to program multiple radios – simply change unit IDs and download the file to each radio

Computer Requirements:

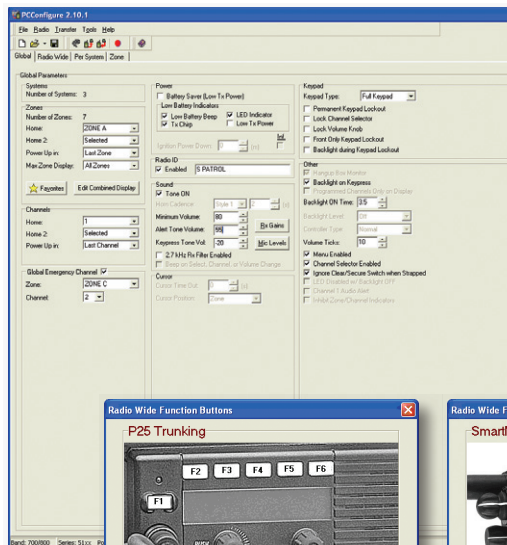
- 800 MHz Pentium or greater
- 128 MB RAM
- 40 MB hard disk space
- CD-ROM drive

The portability of the software lets you program your radios anywhere.

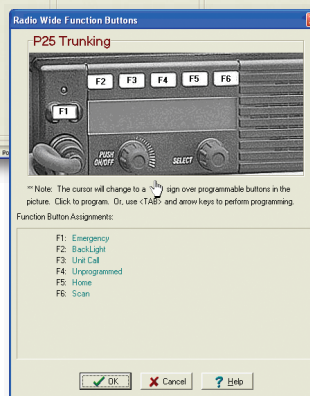


EFJohnson's PC Configure™ software is the most user-friendly programming software for public safety and service radio users. Program all of your EFJohnson mobile and portable radios quickly and easily with the same software package. With minimal setup time or training, PC Configure gives you the flexibility to program your EFJohnson portable or mobile radios for any encryption or system type installed on the radio. PC Configure is a Windows®-based application. With its intuitive and unique graphical display, PC Configure allows you to re-reflash radios much faster than any other radio programming software. PC Configure's "remember" function stores previously programmed parameters (such as software version or options) and recalls them for future use.

Manage encryption keys, channels, zones, and other vital radio functions - all from your PC.



Simplify radio programming with a click of a mouse.



Form S554 8/10 (Supersedes 3/09) Printed in U.S.A.

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Infrastructure

IP25[™]
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Hybrid IP25™ Infrastructure Systems

KEY FEATURES & BENEFITS

- ▶ **Reliable**
- ▶ **Secure**
- ▶ **Feature Rich**
- ▶ **Standards Based**

Trunked and conventional in the same system!

Building out a Project 25 network does not have to be expensive or complicated when you make the right choice. The Hybrid IP25™ system from EFJohnson Technologies is a secure, reliable and innovative wide area conventional system that has many of the features of a trunked system but at a fraction of the cost. Although EFJohnson Technologies is fully committed to both trunked and conventional infrastructure systems, Hybrid IP25 offers the best of both.

Trunked and conventional are no longer separate worlds with Hybrid IP25. Hybrid IP25 wide area conventional system is the first true hybrid network, in which first responders can operate and interoperate between conventional and trunked systems. This eliminates the need for dispatchers to manually patch calls between the two systems. Hybrid IP25 is based on Voice over Internet Protocol (VoIP) which enables it to gracefully scale to accommodate future expansions. Our Hybrid system is the most cost-effective way to provide wide area coverage and includes innovative features such

as roaming and mobility, which are normally only found on trunked systems that cost millions of dollars more.



IP25™
EFJohnson

SMARTNET®

Licensed
Since
1994

SmartZone®

AMBE+2
ENHANCED DIGITAL VOICEDATA



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Hybrid IP25™ Infrastructure Systems

Key Features of the Hybrid System

- ▶ Seamless roaming between trunked and conventional systems, which eliminates the need for dispatchers to manually route calls.
- ▶ Fully distributed switchless architecture that eliminates single point of failure.
- ▶ Common network management and dispatch between trunked and conventional systems, which substantially reduces capital expenses and operating costs.
- ▶ Patented Dynamic Site Recovery: add sites to your system without altering the configurations of your existing sites for fast and inexpensive system growth.
- ▶ Out of Range indicator that transmits a P25 Data beacon at regular intervals to alert the radio that it is out of range.
- ▶ Automatic registration that registers a radio on the network when it moves from site to site.
- ▶ Automatic registration eliminates the need for dispatchers to manually route calls, and allows radio location to be tracked on a site by site basis. This reduces bandwidth constraints and enables more efficient use of channel resources.
- ▶ Analog and digital voting which reduces capital expenses while offering greater network flexibility.
- ▶ Voice over Internet Protocol (VoIP) technology: VoIP is an industry standard protocol that was designed for use in interconnected systems of packet switched computer communication networks. The advantage of VoIP is you can build out your network at an unprecedented speed, while deploying the latest network technology.

**StarGate™ Digital
Dispatch Console**



VoIP Technology

All IP25 systems utilize an inherent Voice over Internet Protocol (VoIP) architecture. Each system element from the repeaters to the network management system and the console utilizes IP for sending voice and data across a heterogeneous packet network. The advantage of IP is installation or expansion of your network occurs with unprecedented speed and with greater reliability due to the distributed IP architecture. No more cumbersome punch blocks or audio switches with this highly scalable architecture.

Freedom Tracker™

The key to full system coverage is not missing a call. EFJohnson's Freedom Tracker™ is a solution that offers trunked-like subscriber roaming mobility across multi-site networks. Because it is internal to the network, Freedom Tracker provides exceptional versatility without adding capital expense.

StarGate™ Dispatch Console

The new StarGate™ IP25 Dispatch Console is the next generation in IP based consoles. Designed from the bottom up for IP control and connectivity in a Project 25 trunked and conventional environment, StarGate offers features and functionality not found in other products. StarGate's unique touch-screen graphical user interface is designed with the dispatcher in mind. Key features include: easily reconfigurable user profiles and screens, 20 watts per channel audio supports up to 10 separate Bose® high fidelity speakers, Enhanced (AMBE+2) Project 25 Vocoder and audio processing engine, DES-OFB Multi Key FIPS 140-2 voice encryption, and enhanced Request to Talk P25 Conventional call management.

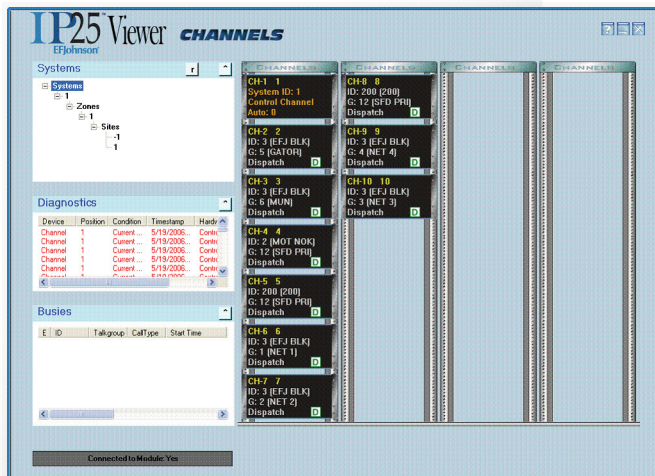
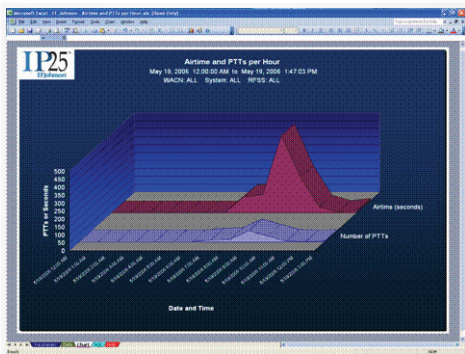
Encryption

EFJohnson has developed the Johnson Encryption Machine (JEM II), which is a state-of-the-art, IP based product engine that provides for the AES/DES encryption capability and P25 AMBE encode/decode elements of our IP25 systems. JEM II is designed on a PCIE card, is packaged within a standard PC and supports our Key Management Facility (KMF II) and the StarGate Dispatch Console offerings. Embedding the JEM II within the PC used for our StarGate Dispatch Console takes advantage of the PC's processing power while reducing a customer's investment in their radio system. It processes encrypted calls at blazing speed, and enables our IP25 system solutions to process simultaneous encryption streams that are an order of magnitude greater than what even multistate regional Project 25 radio systems can generate.

Hybrid IP25™ Systems

Project 25

Telecommunications Industry Association's (TIA) standard for digital 2-way radio technology. Project 25 was originally created by the Association of Public-Safety Communications Officials, International (APCO) in cooperation with the National Association of State Telecommunications Directors (NASTD) and the U.S. government to ensure interoperability between Federal, state, and local public safety agencies. EFJohnson was one of the first developers of wireless communications products to be fully compliant with Project 25 interoperability standards.



About EFJohnson Technologies

EFJohnson Technologies focuses on innovating, developing and marketing the highest quality secure communications solutions to organizations whose mission is to protect and save lives. Our customers include first responders in public safety and public service, the federal government, and industrial organizations. Established in 1923, we were one of the first companies to be fully compliant with the Project 25 standard for interoperability. Our products are marketed under the EFJohnson, 3e Technologies International, and Transcript International trade names and include Project 25 compliant two-way radios, Project 25 compliant trunked and conventional communications systems, voice encryption modules, and FIPS 140-2 Validated™ secure wireless broadband, mesh and WLAN solutions.

MultiSite Trunked IP25™ Infrastructure Systems

EFJohnson's Trunked IP25™ MultiSite Infrastructure System provides a modern trunked Project 25 compliant infrastructure for all of your wide area trunked Land Mobile Radio communications needs.

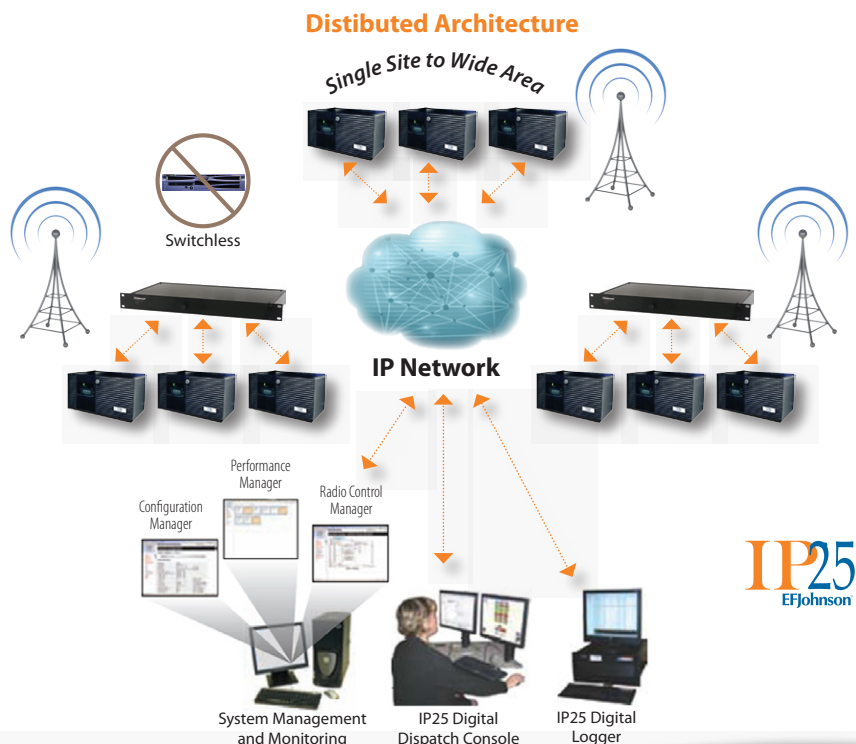
KEY FEATURES & BENEFITS

- ▶ A truly distributed architecture - eliminates critical components to minimize external system threats while maximizing system security
- ▶ Secure plug-and-play network technology affords simple and quick site additions – robust scalability to meet current and emerging system needs
- ▶ IP-based architecture means simple solutions for system connection facilities and logistics, including the linking of geographically dispersed sites and regions
- ▶ Powerful and user-friendly web-based Network Management System
- ▶ Seamless user roaming within expanded coverage area
- ▶ Greater fault tolerance, speed, and reliability than centralized system solutions

Trunked IP25 MultiSite capability offers first responders a highly reliable and affordable wide area P25 compliant system. Additionally, Trunked IP25 MultiSite extends your coverage area in places where RF propagation is inhibited or degraded due to large buildings or rugged topography. Most importantly, EF Johnson's patent pending unique MultiSite technology minimizes bandwidth needs because it uses a single voice stream per call, regardless of the number of sites involved. Our unique call control process is based on a peer-to-peer technique that significantly reduces call setup time and eliminates the need for a hierarchy in a radio system.

Each radio site has the ability to continue voice operations autonomously even if connectivity is lost to some or all other sites in the LMR system. Our distributed architecture technique means each trunked site utilizes hot standby Site Controller cards ensuring that no central point of failure will impact the entire region.

Trunked IP25™ MultiSite Infrastructure System



SMARTNET®

Licensed
Since
1994

SmartZone®

AMBE+2
ENHANCED DIGITAL VOICEDIG



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Trunked IP25™

Infrastructure Systems

KEY FEATURES & BENEFITS

- ▶ **Distributed**
- ▶ **Secure**
- ▶ **Feature Rich**
- ▶ **IP Based**

First responders need a secure, reliable, and flexible Project 25 trunked communication system. EFJohnson's Trunked IP25™ Infrastructure System is a Project 25 compliant trunked system that is designed specifically for public safety and homeland security, and utilizes Voice over Internet Protocol (VoIP) for system integration.

Trunked IP25 provides a modern trunked P25 infrastructure for all of your communications needs. This modern system meets the National Telecommunications and Information Administration (NTIA) mandates for narrow-band operation in VHF and UHF frequencies as well as Department of Defense mandates for Project 25 compliance.

Trunked IP25 is a switchless end-to-end digital environment. This system solution does not require a traditional network switch or Central Electronics Cabinet to link your consoles or repeaters, rather it uses standard off the shelf IP networking equipment.

Your advantages are quicker deployments, fewer network elements to own and maintain, and increased scalability.



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(((AMBE+2)))
ENHANCED DIGITAL VOICODER



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Trunked IP25™ Infrastructure Systems

Interoperability with Legacy Systems

- Trunked IP25 repeaters operate in P25 Digital mode, providing clean digital communications
- EFJohnson's P25 subscriber radios operate in P25 Trunked, P25 Conventional, and SMARTNET®/SmartZone® all in the same radio! Whether you use EFJohnson's innovative P25 radios or P5 compliant subscribers from another supplier, Trunked IP25 provides a secure and reliable system solution.
- Add or reconfigure radios and other network elements as your needs evolve, over the life of the system.

Interoperability Across Multiple Agencies

- Project 25 Common Air Interface (CAI) capability enables users to communicate with other P25 equipment on your network.
- Analog Conventional, P25 Conventional, and P25 trunked channel access and control provide the critical communications paths to your users.
- Radio users can talk to each other in the field. Dispatch centers and command/control facilities can easily conference, which enables critical communication paths when time is vital.
- IP-based console eliminates the need for cumbersome electronics cabinets, reduces costs, minimizes foot print, and streamlines maintenance.

VoIP Technology

All IP25 systems utilize an inherent Voice over Internet Protocol (VoIP) architecture. Each system element from the repeaters to the network management system and the console utilizes IP for sending voice and data across a heterogeneous packet network. The advantage of IP is installation or expansion of your network occurs with unprecedented speed and with greater reliability due to the distributed IP architecture. No more cumbersome punch blocks or audio switches with this highly scalable architecture.

Redundancy and Security

- Multiple voice channels ensure a high level of redundancy and availability for critical calls.
- IP25 Integrated Network Controller is integrated into the repeater, which simplifies system management.
- Trunked IP25 brings encryption and interoperability into the same P25 communications system. FIPS certified, end-to-end encryptions supported include AES and DES-OFB. You can make sure that only the right people are involved in conversations on your system.
- Tighten security by using the IP25 Key Management Facility (KMF) to perform Over the Air Rekeying (OTAR) of all your radios in the field. KMF provides quick, secure, and complete management of subscriber radios.

Elements of the Trunked IP25 System Include:

Repeaters

EFJohnson's P25 repeaters provide the solution for Project 25 digital operation in the VHF, UHF, and 800 MHz bands. For added convenience and network management, these repeaters connect directly to the Ethernet network using industry-standard routers. Software defined configurations enable PC programmability of operating frequency, output power and other functions to provide quick installation capability.

IP25 StarGate Dispatch Console

The new StarGate™ IP25 Dispatch Console is the next generation in IP based consoles. Designed from the bottom up for IP control and connectivity in a Project 25 trunked and conventional environment, StarGate offers features and functionality not found in other products. StarGate's unique touch-screen graphical user interface is designed with the dispatcher in mind. Key features include: easily reconfigurable user profiles and screens, 20 watts per channel audio supports up to 10 separate Bose® high fidelity speakers, Enhanced (AMBE+2) Project 25 Vocoder and audio processing engine, DES-OFB Multi Key FIPS 140-2 voice encryption, and enhanced Request to Talk P25 Conventional call management.

IP25 Network Management System (NMS)

Accessible, intuitive, and powerful. The IP25 Network Management System (NMS) can be accessed by authorized users from any PC with a web browser and network connectivity. User friendly menus and drop down selection boxes make operating the NMS as simple as navigating pages on the Internet. It is a feature rich platform that allows remote configuration and management of the system as well as provides advanced capabilities such as multi-agency partitioning, dynamic regroup, and remote radio disable.

IP25 Viewer

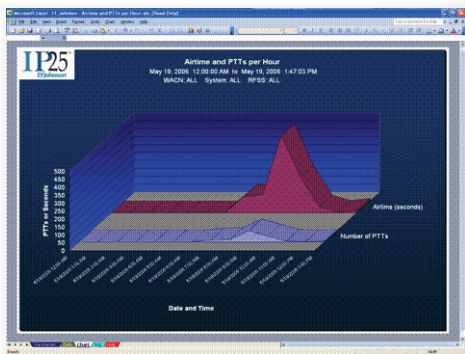
The IP25 Viewer is a suite of software tools that assist the administrator in managing overall performance of the trunking system. Real time scrolling detailed lists or graphical representations of the repeater site can be used to monitor the health of the IP25 Trunking System. A suite of pre- configured reports can be used to observe trends and track system usage.



Trunked IP25™ Systems

Project 25

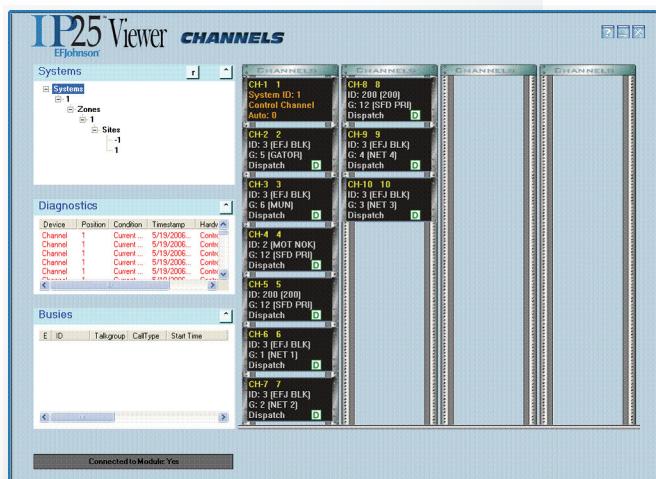
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For more information, visit
www.EFJohnsonTechnologies.com
800-328-3911



StarGate™

Dispatch Console

PUBLIC SAFETY
Communications
2009 HOT PRODUCT

KEY FEATURES & BENEFITS

- ▶ AMBE+2 vocoder for better sounding digital audio
- ▶ End-to-End encryption security with the included AES single key or optional DES-OFB Multi Key FIPS 140-2 using the Johnson Encryption Machine (JEM II)
- ▶ IP based, no proprietary equipment, all COTS for quick and easy installations of equipment not bound by proprietary vendor products
- ▶ Single console for Project 25 Conventional and Trunked for investment protection
- ▶ Next generation user interface revitalizes stagnant technology and relieves the boredom of bland screens
- ▶ Operator-friendly, highly intuitive display modules minimize operator training and downtime
- ▶ Best in class audio fidelity with Bose® speakers; clear Select and Unselect Audio minimizes risk of miscommunicated dispatches
- ▶ Support for up to 24 active talkgroups/radio control modules per console to enable the capacity needed for most dispatch positions
- ▶ Easy patching of multi-agency radios for improved command operations with interoperability of all users in critical incidents
- ▶ Interfaces for 2 telephony ports for simple integration with E911 systems as well as the POTS network for patching telephone calls
- ▶ Customized digital IP audio engine software for better sounding digital to analog audio conversion operation

The dispatch console is the core of your LMR operation, so choose a console with revolutionary new user graphics, absolutely intuitive ease of use, and unsurpassed audio quality. The StarGate™ IP25 Dispatch Console from EFJohnson Technologies is the next generation solution for dispatch centers. StarGate's native IP design doesn't need any central equipment to interface a Project 25 Trunked or Conventional radio system, just a quick RJ45 network connection. The StarGate's custom audio management solution delivers voice clarity and fidelity that is best in class, especially when heard through the standard Bose® speakers. Once you experience the superior audio, you'll be just as impressed with the unique graphical user interface and its easy to use, eye-pleasing display. StarGate is an audio and visual experience that your dispatchers will enjoy... it was designed to make them better at what they do.



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SmartZone®

AMBE+2
ENHANCED DIGITAL VOCODER



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StarGateTM Dispatch Console

Hear the Difference...

We've developed a unique audio management solution that replaces the PC sound card with custom audio amplifiers for StarGate's Select and Unselect speakers. Grueling audio testing drove the development of our audio processing software that dramatically improves analog conversion of P25 digital audio with an adaptive jitter buffer (a solution that makes digital audio sound much better). This improvement combined with our Bose® speakers reproduce LMR audio with the fidelity and clarity that dispatchers have told us they want and need.

See the Difference...

StarGate's enhanced graphical user interface was developed with guidance from hours of dispatch operator focus groups. Eye-pleasing shapes and colors, large and easy to read alphanumeric, combined with customized setups mean that your dispatchers will find StarGate easy and comforting to work with, even at the end of a long and busy shift. You'll also notice how easy it is to train new operators and how quickly you can bring them up to speed. Supported by a switchless, native IP design, you'll be amazed at the ease of installation and the continuance of uninterrupted dispatch operations when you replace your aging and obsolete analog devices with our next generation StarGate Dispatch Console.

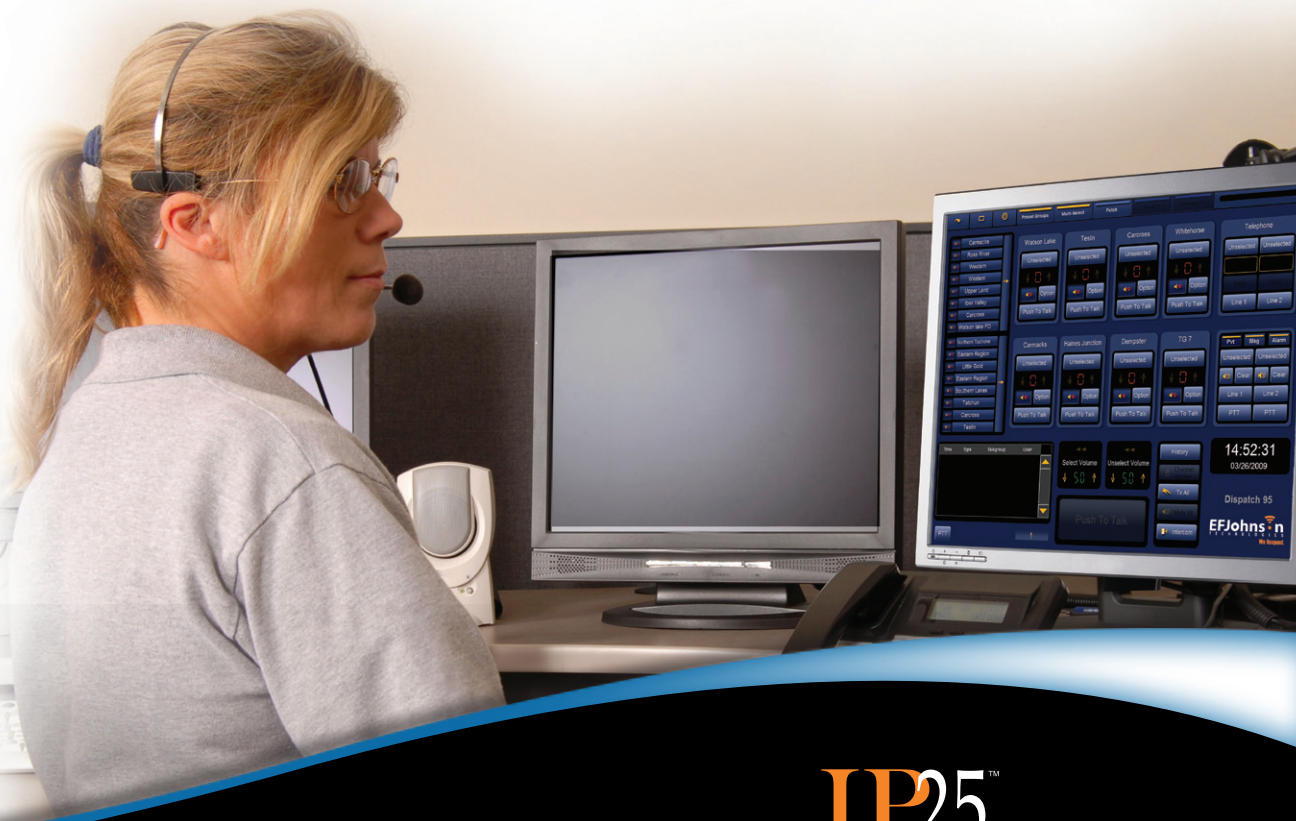


Experience the Difference...

In the pulse of your of your dispatch center's operations as your operators perform their critical duties with more interest focused attention to what they see on their monitors and with more certainty of what they hear from the radio users talking to them. While it may seem subtle, isn't your dispatch center all about your visual and audible senses? StarGate gives you such a dramatically improved dispatch solution...one that can't be seen or heard from the variety of stagnant product choices available to you today.

Project 25

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IP25TM
EFJohnson

StarGate™ Dispatch Console

- ▶ Eight radio control modules (RCMs) in the main console display, with 16 more minimized for instant display
- ▶ 16 character talkgroup name and 12 character user alias in each RCM
- ▶ Fast MultiSelect Call Setup for responsive incident management
- ▶ Emergency declarations include distinctive visual and audio alerts
- ▶ Call History display that can be maximized and used as a unique dispatch management tool
- ▶ P25 Group and Private Calls, clear and encrypted in addition to All Call, Telephone Interconnect and Console Intercom
- ▶ Discrete equalizer controls for TX audio

About EFJohnson Technologies

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800-328-3911

3800 Digital Repeater

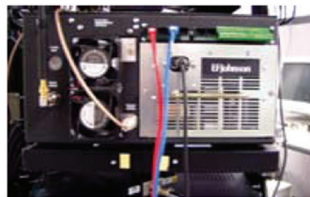
KEY FEATURES & BENEFITS

- ▶ Trunking controller is built into the repeater, which simplifies network management
- ▶ Ethernet interface enables easy network connectivity
- ▶ Frequency bands available are VHF, UHF, and 800 MHz
- ▶ Project 25 Common Air Interface operation
- ▶ Each Subsystem can have up to 28 channels (27 for traffic and 1 for control)
- ▶ Fits into a standard 19" equipment rack
- ▶ Network Management provides automatic configuration of the repeater and remote software upgrades
- ▶ Conservative design of power amplifier circuitry uses multiple devices for maximum heat transfer and minimum operating temperatures for long life
- ▶ Conservative design of power amplifier circuitry uses multiple devices for maximum heat transfer and minimum operating temperatures for long life
- ▶ Dual synthesizers with ± 1.0 part per million stability ensure on-frequency operation of transmitter and receiver
- ▶ Front panel status indicators show operating status and diagnostic information for rapid evaluation and servicing
- ▶ DSP Processing and flash memory allows updating of radio operating software via the Network Manager to meet future needs

EFJohnson's 3800 Series repeaters provide secure digital communications for first responders operating Project 25 trunked networks. As a key piece of the Trunked IP25™ system solution, the 3800 Series delivers performance you can always count on - today and tomorrow.

The 3800 Series repeaters use Voice over Internet Protocol (VoIP) technology to enable intelligent network communications without costly and complex centralized switching equipment. With a trunking controller built into the repeater, network management is right at your fingertips.

PC programmable options provide flexibility, simplified setup, and easy field upgrades. The fully synthesized design of the 3800 Series enables you to make frequency changes quickly and easily. The modular design of the 3800 Series simplifies maintenance and servicing.



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3800 Digital Repeater

Typical Performance Specifications

| GENERAL | 38x1 (VHF) | 38x4 (UHF) | 38x7 (700 MHz) | 38x8 (800 MHz) |
|--------------------------------------|--|--|--|--|
| Mounting | | 19" rack or shelf | | |
| Dimensions (HxWxD) | | 9.0"x 17.0"x 20.9" (23cm x 43cm x 53 cm) | | |
| Weight | | 66 lbs. (29.95 kg) | | |
| Temperature Range | | -30°C to +60°C | | |
| Input Voltage | | 100 to 240 VAC | | |
| Input Frequency | | 50 to 60 Hz | | |
| Power Requirements | At 110W - 560 Watts At 25 W - 170 Watts Standby - 45 Watts | At 110W - 457 Watts At 25 W - 170 Watts Standby - 45 Watts | At 175W - 680 Watts At 75 W - 450 Watts Standby - 45 Watts | At 175W - 680 Watts At 75 W - 450 Watts Standby - 45 Watts |
| Frequency Resolution | 5/6.25 kHz | 6.25 kHz | 12.25 kHz | 12.25 kHz |
| FCC Type Acceptance Number | ATH2422001-1 | ATH2422004-1 | ATH2422607 | ATH2422008-1 |
| FCC Compliance | Parts 15, 90 | Parts 15, 90 | Parts 15, 90 | Parts 15, 90 |
| Industry Canada Certification | IC: 933195702A | | | |
| TRANSMITTER | | | | |
| Frequency Range | 132-150, 150-178 MHz | 380-400, 400-430, 430-470, 470-512 MHz | 769-775 MHz | 851-870 MHz |
| RF Output Power | 25 to 110 Watts | 25 to 110 Watts | 75 to 175 Watts | 75 to 175 Watts |
| Duty Cycle | 100% | 100% | 100% | 100% |
| Output Impedance | 50 ohm | 50 ohm | 50 ohm | 50 ohm |
| Spurious Emissions | -90 dBc | -90 dBc | -90 dBc | -90 dBc |
| Harmonic Emissions | -90 dBc | -90 dBc | -90 dBc | -90 dBc |
| Maximum Deviation | ± 3110 Hz | ± 3110 Hz | ± 5 kHz/± 3110 Hz | ± 5 kHz/± 3110 Hz |
| Emission Designators | 8K10F1E | 8K10F1E | 8K10F1E | 8K10F1E |
| Frequency Stability (-30°C to +60°C) | ± 1.0 PPM | ± 1.0 PPM | ± 0.1 PPM | ± 1.0 PPM |
| RECEIVER | | | | |
| Channel Spacing | 12.5 kHz | 12.5 kHz | 12.5 kHz | 12.5 kHz |
| Frequency Range | 132-150, 150-178 MHz | 380-400, 400-430, 430-470, 470-512 MHz | 799-805 MHz | 806-825 MHz |
| Sensitivity: <i>for 5% BER</i> | 0.25µV | 0.30µV | 0.25µV | 0.25µV |
| Selectivity | -60 dB | -60 dB | -60 dB | -60 dB |
| Signal Displacement Bandwidth | ± 1 kHz | ± 1 kHz | ± 1 kHz | ± 1 kHz |
| Frequency Stability (-30°C to +60°C) | ± 1.0 PPM | ± 1.0 PPM | ± 1.0 PPM | ± 1.0 PPM |
| Intermodulation Rejection | -85 dB | -85 dB | -77 dB | -80 dB |
| Spurious & Image Rejection | -95 dB | -100 dB | -90 dB | -90 dB |
| RF Input Impedance | 50 ohms | 50 ohms | 50 ohms | 50 ohms |

STANDARDS COMPLIANCE

EFJohnson's radio repeaters comply with the following standard specifications:

P25 Digital Operation: TIA/TSB 102, CAAB
EMI/EMC: NTIA Manual Chapter 5
FCC Part 90
FCC Part 15
PSTN Line Isolation: FCC Part 68 (USA)

Conventional IP25™ Infrastructure Systems

KEY FEATURES & BENEFITS

Conventional IP25™ provides a flexible, cost-effective solution for conventional systems. It delivers a complete Project 25 compliant solution that provides:

- ▶ **Scalability** – cost effective for small, medium and large system deployments
- ▶ **Expandability** – new features and capabilities easily added – many with only a new software load
- ▶ **Graceful Migration** – ability to migrate from analog to digital systems and to future Project 25 enhancements

Using industry-standard VoIP technology, Conventional IP25™ provides a secure, reliable infrastructure that you can always count on.

Whether you use Conventional IP25™ with EFJohnson's proven portable and mobile radios or equipment from another supplier, you'll have a Project 25 network that fulfills your requirements and exceeds your expectations.

Building out a Project 25 network can be easy, when you make the right choice. Meet the Conventional IP25™ Infrastructure System from EFJohnson. Conventional IP25™ provides the secure, reliable infrastructure for your communications needs — today and tomorrow.



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Conventional IP25™

Infrastructure Systems

Conventional IP25™ Integrates These Elements:

- ▶ EFJohnson's powerful base station/repeaters
- ▶ Choice of dispatch consoles
(IP25™ Digital Dispatch Console or
StarGate™ Dispatch Console pictured below)
- ▶ Secure Key Management Facility
- ▶ IP25 Voter



Project 25

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2600 Series Base Station/Repeaters

These powerful repeaters adaptively support communications of both analog and P25 digital subscriber equipment. For added convenience, the dual mode base station/repeaters interconnect throughout your network using industry-standard routers.

IP25 StarGate Dispatch Console

The new StarGate™ IP25 Dispatch Console is the next generation in IP based consoles. Designed from the bottom up for IP control and connectivity in a Project 25 trunked and conventional environment, StarGate offers features and functionality not found in other products. StarGate's unique touch-screen graphical user interface is designed with the dispatcher in mind. Key features include: easily reconfigurable user profiles and screens, Enhanced (AMBE+2) Project 25 Vocoder and audio processing engine, DES-OFB Multi Key FIPS 140-2 voice encryption, and enhanced Request to Talk P25 Conventional call management.

Key Management Facility

Maintaining control over the radios on your network is a vital function. EFJohnson's Key Management Facility (KMF) enables you to control every P25 OTAR (Over-the-Air Rekeying) compliant radio on your network. OTAR capability allows you to rekey your radios in the field, wherever they are and whenever you need them. EFJohnson offers an exceptional PDA-based key loader, which extends your reach even further.

Network Interface Unit

The Network Interface Unit acts as the gateway between analog dispatch equipment, telephone interconnect devices, and conventional network digital systems.

IP25 Voter

The IP25 Voter uses sophisticated voting algorithms to enhance receive audio quality by receiving and comparing the receive signals from various receivers and selecting the best signal. The IP25 Voter supports analog and digital voting.

Interoperability

At EFJohnson, interoperability is more than just a catch phrase. It's the focus of our business. The IP25 systems are designed to work with any Project 25 compliant radios, not just those designed by EFJohnson. If your equipment is in compliance with P25, you can be certain that it will work on our system.

VoIP Technology

Voice over Internet Protocol (VoIP) is the transfer of voice signals over Internet Protocol. IP is an industry standard protocol that was designed for use in interconnected systems of packet-switched computer communication networks. The advantage of VoIP is you can build out your network at an unprecedented speed, while deploying the latest network technology.



IP25[™]
EFJohnson

Conventional IP25™ Systems

EFJohnson was the first to implement an IP-based, cost effective Project 25 Conventional System. Designed to support both analog and digital communication, Conventional IP25™ enables the coexistence of legacy analog radios and equipment with advanced P25 digital radios and equipment. Instead of overhauling all existing radios in order to take advantage of digital P25 features and capabilities, Conventional IP25™ allows you to migrate at your own pace with advanced features and wide area capability. All without the high cost of a trunking system.

Conventional IP25™ is the perfect marriage of two standards. Project 25's advanced first responder features and Internet Protocol's heterogeneous packet switched networking.

Highlights:

P25 Conventional System

- ▶ Adaptive Analog and Digital
- ▶ Adaptive 12.5 kHz and 25 kHz
- ▶ Adaptive Clear or Encrypted communication

IP based Architecture

- ▶ Intelligent IP based wide area routing
- ▶ No expensive Central Electronics Banks

Advanced Features

- ▶ Individual calls
- ▶ Group calls
- ▶ Caller Validation
- ▶ Transmitter steering

Interoperability

- ▶ Multi mode (Analog and Digital) Operation
- ▶ Cross mode calling (Analog - Digital) Cross band calling (UHF, VHF, 800)
- ▶ Ethernet to 4-wire conversion for legacy analog devices

Secure

- ▶ AES and DES End-to-end Encryption
- ▶ Over-the-Air Rekeying using IP25 Key Management Facility

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BENELEC Pty Ltd

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Mascot NSW 2020

T: 02 9364 7000 F: 02 9364 7099

E: inquiries@benelec.com.au

2600 Digital Repeater/Base Station

KEY FEATURES & BENEFITS

Standards Based

- ▶ The 2600 Series meets the requirements for Project 25 digital operation and TIA 603 analog operation and will interoperate with similarly compliant radios. The 2600 series also supports Internet Protocol (IP) for VoIP operation.

Multiple Modes

- ▶ The 2600 series repeater can be configured to operate in analog, P25 digital or mixed mode.

Multiple Call Types

- ▶ The 2600 series supports multiple call types including individual and group calls, clear and encrypted calls, and emergency calls

High Power

- ▶ Adjustable, high TX output power. The VHF and UHF repeaters can be set for 25-110 Watts, and the 800 MHz repeater can be set for 25-175 watts.

Inherent IP Architecture

- ▶ These repeaters include an Ethernet port for 10/100 BaseT connection. IP Networking provides quick intelligent network communications without costly and complex switching equipment.

Wide Area Capable

- ▶ The IP architecture makes it simple to connect 2600 Series Repeaters for wide area applications such as multicasting and transmitter steering.

Interoperable with Existing Analog Equipment

- ▶ The addition of the IP25 Network Interface Unit (NIU) enables advanced P25 features, advanced networking capability, and also serves as a gateway between existing analog 4W equipment and the digital IP25 repeaters and console.

Reliable

- ▶ Conservative design, efficient PA heat sink and continuous performance monitoring ensure highly reliable, worry free operation.

EFJohnson's 2600 Series Repeater/Base Station was designed to meet the demanding needs of First Responders. This field-proven product combines performance, reliability and advanced features for worry-free operation when it is needed most.

The 2600 can be configured as a repeater or as a base station in a conventional analog, Project 25 digital or mixed mode network. When operating in mixed mode, it has the ability to detect the signaling mode of an incoming call. It then returns the call back out over the air using the same protocol as was received.

A wide range of receiver protection methods are available including CTCSS, CDCSS and NAC. Up to 50 CTCSS and 18 CDCSS are provided with the community repeater option. Multiple interfaces support network communications: 4-wire analog used to connect the station to a remote controller or analog dispatch equipment, and digital Ethernet used for linking stations or linking the station to dispatch equipment using Voice over Internet Protocol (VoIP).

The standalone 2600 is a feature-rich product that supports many advanced P25 features such as group calls, emergency and System All Call. But the addition of the IP25™ Network Interface Unit (NIU), a conventional "site controller," the capability is expanded to include such features as unit and talk group validation, and cross-band and cross-mode call routing across multiple sites.

Software defined configurations allow for PC programmability of operating frequency, output power and other functions - providing quick installation capability. Front panel status indicators and two-line display show operating status and provide on-site diagnostics for rapid evaluation and servicing.



Five Channels
& 7-Foot Rack



IP25™
EFJohnson

SMARTNET®
SmartZone®

AMBE+2
ENHANCED DIGITAL VOICEDATA

P25
DIGITAL WIRELESS • SAME DAY
INSTALLATION • 24 HOURS

MADE IN
AMERICA

EFJohnson
TECHNOLOGIES
We Respond.

www.efjohnsontechnologies.com

2600 Digital Repeater/Base Station

Typical Performance Specifications

| GENERAL | 26x1 (VHF) | 26x4 (UHF) | 26x7 (700 MHz) | 26x8 (800 MHz) |
|-------------------------------|--|--|--|--|
| Mounting | | 19" rack or shelf | | |
| Dimensions (HxWxD) | | 9.0" x 17.0" x 20.9" (23cm x 43cm x 53 cm) | | |
| Weight | | 66 lbs. (29.95 kg) | | |
| Temperature Range | | -30°C to +60°C | | |
| Input Voltage | | 100 to 240 VAC | | |
| Input Frequency | | 50 to 60 Hz | | |
| Power Requirements | At 110W - 560 Watts At 25 W - 170 Watts Standby - 45 Watts | At 110W - 457 Watts At 25 W - 170 Watts Standby - 45 Watts | At 175W - 680 Watts At 75 W - 450 Watts Standby - 45 Watts | At 175W - 680 Watts At 75 W - 450 Watts Standby - 45 Watts |
| Frequency Resolution | 5/6.25 kHz | 6.25 kHz | 12.25 kHz | 12.25 kHz |
| FCC Type Acceptance Number | ATH2422001-1 | ATH2422004-1 | ATH2422607 | ATH2422008-1 |
| FCC Compliance | | Parts 15, 90 | | |
| Industry Canada Certification | IC: 933195702A | | | |

| TRANSMITTER | ANALOG | DIGITAL | ANALOG | DIGITAL | DIGITAL | ANALOG | DIGITAL |
|--------------------------------------|----------------------|----------------------|--|-----------------|-----------------|------------------------------------|-----------------|
| Frequency Range | 132-150, 150-178 MHz | 132-150, 150-178 MHz | 380-400, 400-430, 430-470, 470-512 MHz | | 769-775 MHz | 851-870 MHz | 851-870 MHz |
| RF Output Power | 25 to 110 Watts | 25 to 110 Watts | 25 to 110 Watts | 25 to 110 Watts | 75 to 175 Watts | 75 to 175 Watts | 75 to 175 Watts |
| Duty Cycle | | | 100% | 100% | | | |
| Output Impedance | | | 50 ohm | | | | |
| Spurious Emissions | | | -90 dBc | | | | |
| Harmonic Emissions | | | -90 dBc | | | | |
| Maximum Deviation | ± 5 kHz/ ± 2.5 kHz | ± 3110 kHz | ± 5 kHz/ ± 2.5 kHz | ± 3110 kHz | ± 3110 kHz | ± 5 kHz | ± 3110 kHz |
| Audio Response | +1, -3 dB/TIA | As per TIA | +1, -3 dB/TIA | As per TIA | As per TIA | +1, -3 dB/TIA | As per TIA |
| Audio Distortion | Less than 296 | As per TIA | Less than 296 | As per TIA | As per TIA | Less than 296 | As per TIA |
| Emission Designators | 11K0F3E, 16K0F3E | 8K10F1E | 11K0F3E, 16K0F3E | 8K10F1E | 8K10F1E | 16K0F3E, 14K0F3E, 11K0F3E, 8K10F1E | |
| Hum & Noise (TIA) | -50/-55 dB | N/A | -50/-55 dB | N/A | | -45dB/-50 dB1 | N/A |
| Frequency Stability (-30°C to +60°C) | | | ± 1.0 PPM | | ± 0.1 PPM | | |

| RECEIVER | ANALOG | DIGITAL | ANALOG | DIGITAL | DIGITAL | ANALOG | DIGITAL |
|--------------------------------------|-----------------------------|----------------------|--|------------|-------------|------------------|-------------|
| Channel Spacing | 30/25/15/12.5 kHz | 12.5 kHz | 25/12.5 kHz | 12.5 kHz | 12.5 kHz | 25/12.5 kHz | 12.5 kHz |
| Frequency Range | 132-150, 150-178 MHz | 132-150, 150-178 MHz | 380-400, 400-430, 430-470, 470-512 MHz | | 799-805 MHz | 806-825 MHz | 806-825 MHz |
| Sensitivity: 12dB SINAD | 0.25µV | N/A | 0.30µV | N/A | N/A | 0.25µV | N/A |
| Sensitivity: for 5% BER | N/A | 0.25µV | N/A | 0.30µV | 0.25µV | N/A | 0.25µV |
| Selectivity | -85/-80 dB | -60 dB | -90/-75 dB | -60 dB | -60 dB | -85/-80 dB | -60 dB |
| Signal Displacement Bandwidth | ± 2 kHz/ ± 1 kHz | ± 1 kHz | ± 2 kHz/ ± 1 kHz | ± 1 kHz | ± 1 kHz | ± 2 kHz/ ± 1 kHz | ± 1 kHz |
| Frequency Stability (-30°C to +60°C) | | | ± 1.0 PPM | | ± 0.1 PPM | | |
| Intermodulation Rejection | -85 dB | | -85 dB | | -77 dB | -77 dB | -80 dB |
| Spurious & Image Rejection | -95 dB | | -100 dB | | -90 dB | -90 dB | -90 dB |
| Audio Response (1000 Hz ref.) | +1, -3 dB/TIA | As per TIA | +1, -3 dB/TIA | As per TIA | As per TIA | +1, -3 dB/TIA | As per TIA |
| Audio Distortion (at 1000 Hz) | Less than 3% @ 0.5W/16 ohms | As per TIA | Less than 3% @ 0.5W/16 ohms | As per TIA | As per TIA | Less than 3% | As per TIA |
| Hum & Noise (TIA) | -50 dB | N/A | -50 dB | N/A | N/A | -45 dB | N/A |
| RF Input Impedance | 50 ohms | 50 ohms | 50 ohms | 50 ohms | 50 ohms | 50 ohms | 50 ohms |
| NTIA Certificate Number | | | JF-129002 (380-400, 400-430 MHz) | | | | |

STANDARDS COMPLIANCE

EFJohnson's radio repeaters comply with the following standard specifications:

P25 Digital Operation: TIA/TSB 102.CAAB

Analog FM Operation: TIA/EIA 603

EMI/EMC: NTIA Manual Chapter 5

FCC Part 90

FCC Part 15

PSTN Line Isolation:

FCC Part 68 (USA)

1 Hum & Noise specification temporarily reduces to 45 dB when the cooling fans are running.



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Key Management Facility II

KEY FEATURES & BENEFITS

- ▶ Open Architecture – Manage the encryption keys of any P25 OTAR-compliant mobile or portable radio
- ▶ Administration – Query the radios to find out what keys are currently loaded, which helps in troubleshooting
- ▶ Security – Communicate between the KMF II server and client over a secure TCP/IP session
- ▶ Flexibility – Support for up to 100 clients & database support for up to 80,000 subscribers
- ▶ Organization – Manage secure radio communications among talkgroups, enable operators to visually track members and encryption keys assigned to each group
- ▶ Simplicity – Set up KMF II in minutes with minimal training
- ▶ Convenience – Import/Export subscriber data from & to external databases

EF Johnson's Conventional IP25™ Infrastructure Systems combine the global reach of the VoIP infrastructure standard with the Project 25 Common Air Interface (CAI). Maintaining security and control over the radios on your network is a vital function. Control every P25 radio on your network with EF Johnson's Key Management Facility II (KMF II). KMF II is a secure, fast P25-compliant client-server solution that simplifies secure key management and distribution.

Using Sophisticated Encryption Keys...

KMF II provides you with a reliable, flexible, and portable means to securely manage your communications. Centralizing your key management eliminates the need to manually rekey your radios. The rekeying feature in the KMF II, known as Over-the-Air-Rekeying (OTAR), encrypts and sends the keys and related key management messages to prevent them from being compromised. For added security, KMF II enables you to send new keys to any radio on your system. You can create talkgroups to ensure that messages are communicated to the right people at the right time. If a radio is lost or falls into the wrong hands, KMF II gives you the ability to disable and zeroize it.



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Key Management Facility II

Conventional IP25™
Infrastructure Systems

Essential KMF II Features:

- ▶ Create and delete keys
- ▶ Manage field radios
- ▶ Manage radios as subscriber groups
- ▶ Share Keys between KMFs (Both EFJ and Motorola KMF equipment)*
- ▶ Segregated KMFs for true user partitioning
- ▶ Eliminate the need to manually rekey traffic keys in radios and consoles.
- ▶ Update subscribers with latest encryption-related material
- ▶ Remove all keys from a subscriber, should it become lost or compromised
- ▶ Display a searchable log of all OTAR-related system activity
- ▶ Allows for frequent rekeying

Key KMF II Functions:

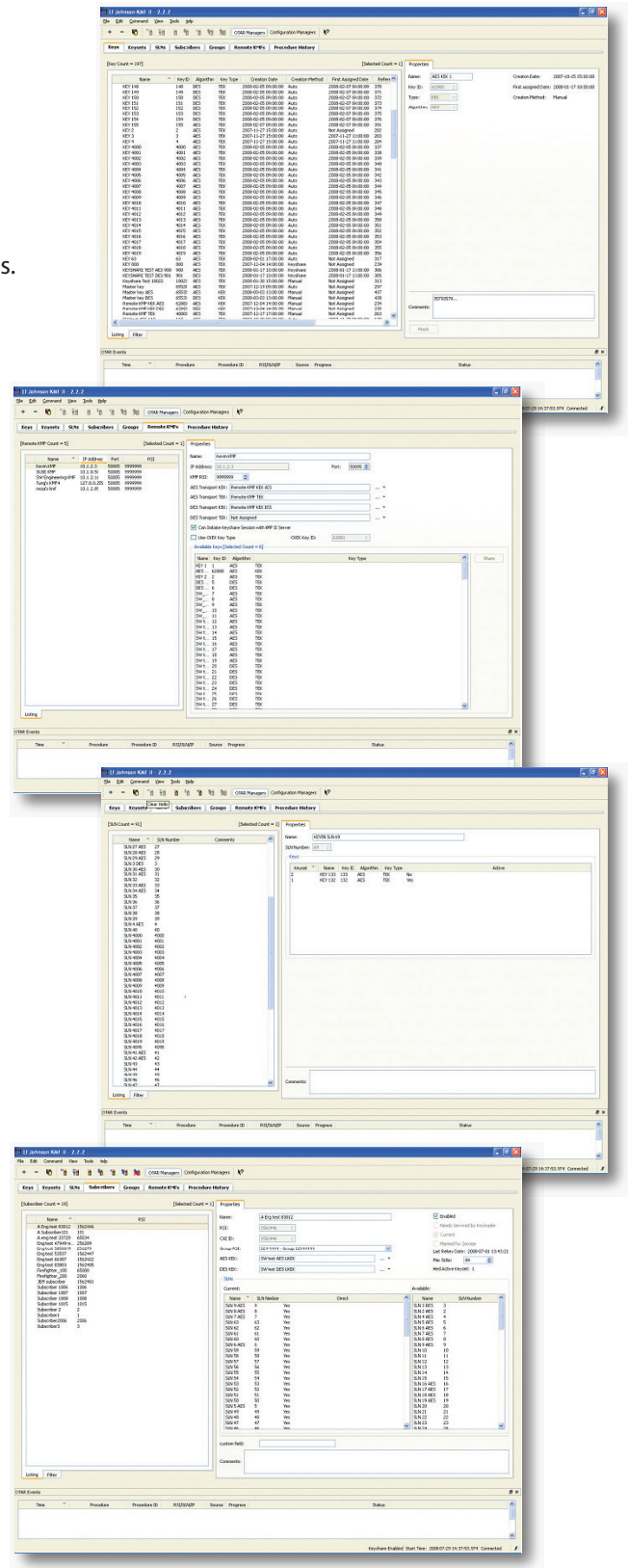
- ▶ Creating and deleting keys
- ▶ Managing subscribers
- ▶ Managing subscriber groups
- ▶ Determining whether subscriber can be successfully addressed
- ▶ Updating subscribers with latest encryption-related material
- ▶ Removing all keys from a subscriber, should it become lost or compromised
- ▶ Display a searchable log of all OTAR-related system activity

System Components:

- ▶ Application software
- ▶ Windows XP-based client workstation
- ▶ Linux-based hardware server
- ▶ Johnson Encryption Machine (JEM)

Project 25

Telecommunications Industry Association's (TIA) standard for digital 2-way radio technology. Project 25 was originally created by the Association of Public-Safety Communications Officials, International (APCO) in cooperation with the National Association of State Telecommunications Directors (NASTD) and the U.S. government to ensure interoperability between Federal, state, and local public safety agencies. EFJohnson was one of the first developers of wireless communications products to be fully compliant with Project 25 interoperability standards.



IP25™ Digital Dispatch Console

Conventional IP25™ Infrastructure Systems

KEY FEATURES & BENEFITS

Point, Click, Control

- ▶ The IP25 Digital Dispatch Console is easy to configure. Customize your display features, capabilities and visual presentation with just a point and click. Develop multiple screens based on individual dispatchers' roles and responsibilities, user requirements or mission needs.

IP Radio Capability

- ▶ Communicate with all of the P25 radios on your network with the IP25 Digital Dispatch Console's radio capability. Simply connect a microphone and speakers to the IP25 Digital Dispatch Console, and you can talk to your field radios from anywhere. In addition to being able to communicate with P25 conventional radios, you can communicate with existing non-P25 conventional and trunking protocols through the EFJohnson IP25 Gateway.

EFJohnson's Conventional IP25™ Infrastructure System provides the secure, reliable infrastructure for your communications needs—today and tomorrow. IP25 combines the global reach of the VoIP infrastructure standard with the Project 25 Common Air Interface (CAI). IP25's Digital Dispatch Console operates on a custom Windows® XP-based PC requiring less space than traditional desk-sized command consoles — and provides the interface into the IP25 packet network.



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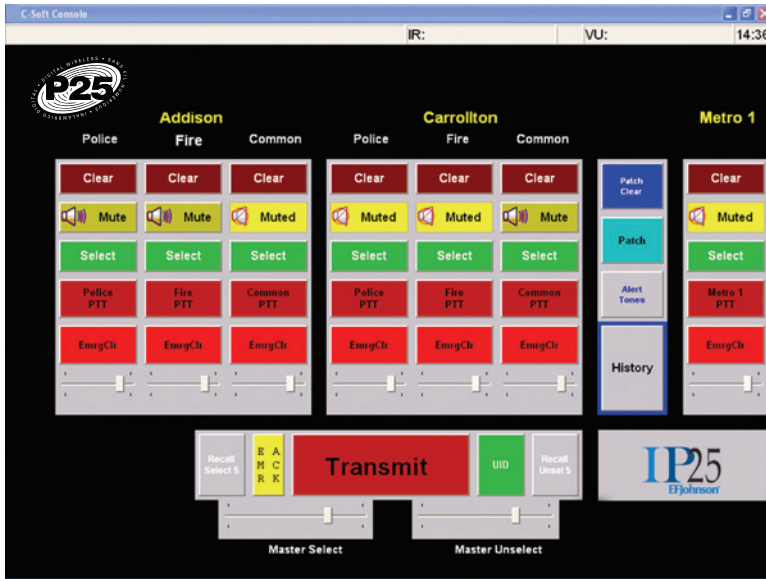


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www.efjohnsontechnologies.com

IP25™ Digital Dispatch Console

*Conventional IP25™
Infrastructure Systems*



Advantages:

- ▶ User-friendly graphical user interface
- ▶ Easy to set up and use so you can manage your network in no time
- ▶ Runs on a Windows XP-based computer
- ▶ Communicate with P25 radios on your network on an individual basis, or establish talkgroups
- ▶ Deploy more consoles in less space than ever before

System Specifications:

Windows XP operating system
Pentium® 2 processor or greater
10/100 BaseT Ethernet port
Sound Card
128 MB RAM
100 MB disk space

Project 25

Telecommunications Industry Association's (TIA) standard for digital 2-way radio technology. Project 25 was originally created by the Association of Public-Safety Communications Officials, International (APCO) in cooperation with the National Association of State Telecommunications Directors (NASTD) and the U.S. government to ensure interoperability between Federal, state, and local public safety agencies. EFJohnson was one of the first developers of wireless communications products to be fully compliant with Project 25 interoperability standards.

Conventional IP25™ Voter

Conventional IP25™ Infrastructure Systems

KEY FEATURES & BENEFITS

Point, Click, Control

- ▶ The IP25 Digital Dispatch Console is easy to configure. Customize your display features, capabilities and visual presentation with just a point and click. Develop multiple screens based on individual dispatchers' roles and responsibilities, user requirements or mission needs.

IP Radio Capability

- ▶ Communicate with all of the P25 radios on your network with the IP25 Digital Dispatch Console's radio capability. Simply connect a microphone and speakers to the IP25 Digital Dispatch Console, and you can talk to your field radios from anywhere. In addition to being able to communicate with P25 conventional radios, you can communicate with existing non-P25 conventional and trunking protocols through the EFJohnson IP25 Gateway.



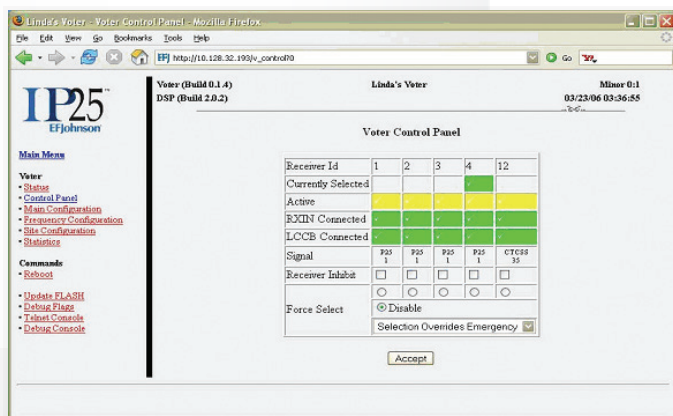
EFJohnson's Conventional IP25™ Infrastructure System provides secure, reliable communications for First Responders. It combines Project 25 advanced private land mobile radio features and Common Air Interface with the Internet Protocol (IP), the global standard for packet data networks.

The Conventional IP25 Voter helps correct the imbalance caused by highpower transmit sites with a large talk out range, and low-powered mobile and portable radios with a relatively small talkback range. The IP25 Voter works with geographically dispersed receive sites to extend the talkback range of conventional mobiles and portables.

The Conventional IP25 Voter uses a modern, software based design that supports analog, P25 digital, clear or encrypted communication. This mixed mode voting comparator has multiple DSPs, utilizing multiple quality indicators to select the best signal for re-transmission and/or routing to a dispatch console.

The IP25 Voter is ideal for small or large systems. A single IP25 Voter can support up to 16 receivers operating on the same frequency. Its inherent IP architecture enables low cost, single-site or wide area systems, and simple implementation of features such as multicast and transmitter steering.

Whether public safety or federal government, the IP25 Voter is the ideal choice for First Responders needing fast, reliable, high quality communication.



IP25™
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Conventional IP25™ Voter

Integrated Analog and Digital Voting

The IP25 Voter is a conventional voting comparator that supports both analog and P25 digital signal voting in a single rack unit device. It also supports clear and encrypted digital calls.

Sophisticated Algorithms Using Multiple Quality Methods

The IP25 Voter utilizes multiple DSPs and multiple methods of comparison to ensure the best signal is selected for communication. The type of call (analog or digital) and signal conditions (strong or weak) are used to determine the voting method or methods. For analog calls, the voting algorithm will use a combination Out-of-Band Energy (OOBE), Received Signal Strength Indication (RSSI), and Signal-to-Noise Ratio (SNR), with OOBE providing the most valuable information in weak signal conditions and RSSI providing the most valuable information in strong signal conditions. For digital calls, quality selection is based on error counts, and in situations where multiple packets have no errors or the same number of errors, the Voter will use RSSI.

Call Priority and Arbitration

In situations where calls are received from multiple sources at the same time, the Voter will use priority and the configurable rules of Preemption and Ruthless Preemption to determine which call source should take over the channel. Emergency calls are automatically given the highest priority and will preempt any preexisting non-emergency calls regardless of the configuration of the Preemption or Ruthless Preemption options.

Voting System Management

The Voting System Management application allows remote configuration, administration and maintenance of the Voting System. The System Management application can be accessed using a standard Internet browser. To ensure the operation of the IP25 Voter, the System Manager can be used for the following:

- Monitor voting system operations including which receivers are connected, active in a call and selected.
- Control the voting system including disabling or forcibly selecting a receiver.
- View system alarms including a receiver or link failure, IP25 Voter DSP failure or socket failure.
- Generate hourly, daily, weekly or monthly statistical reports on voting activity.

Voice-over-IP Architecture

The IP25 Conventional System utilizes a Voice-over-IP (VoIP) architecture. Each element in the system, including the IP25 Voter, has an Ethernet port and software supporting standard Internet Protocol (IP) networking. This native IP architecture allows quick plug and play installation, feature rich, wide area routing and remote software upgrades.

No complicated wiring, crosspatch panels or Centralized Electronics Banks are needed. Multicast and transmitter steering are a snap with IP call routing. New software for the IP25 Voter can be easily sent using FTP.

| | |
|--------------------------|---|
| Specifications: | |
| Interface | Dual 10/100 Base T Ethernet |
| Max. Number of Receivers | Up to 16 |
| Analog Voting Methods | Signal to noise ratio (SNR) Received Signal Strength Indication (RSSI) Out of band Noise (OOBN) |
| Digital Voting Methods | Bit Error Rate (BER) Received Signal Strength Indication (RSSI) |
| Voting Rate | Up to 50 votes per second |
| Receiver Protections | |
| Analog | CTCSS, CDCSS |
| Digital | NAC |
| Operating Temperature | -30 to +60 |
| Humidity | 5% to 95% Non-condensing |
| Power Requirements | 12-24 VDC 110-240 VAC, 50-60 HZ |
| Power Consumption | 12 Watts |
| Dimensions | 1.75" H x 19" W x 12" D (1 RU) |
| Weight | 10 lbs |

Information Assurance

IP25™ Information Assurance Secure Radio Systems

Security Data Integrity

Servers and Workstations | Network Components | LMR Components

The National Security Agency defines Information Assurance as measures that protect and defend information and information systems by ensuring their availability, integrity, authentication, confidentiality, and non-repudiation. These measures include providing for restoration of information systems by incorporating protection, detection, and reaction capabilities.

EFJohnson Technologies provides Information Assurance on its IP25 family of Project 25 compliant infrastructure systems. Our solution satisfies the basic components of Network Security, Confidentiality, Integrity, and Availability.

This includes:

Servers and Workstations

- ▶ Anti-virus protection
- ▶ Host Based Intrusion Detection
- ▶ Password Authentication
- ▶ Auditing and Logon Activity Monitoring
- ▶ Operational Hardening

Network and Interconnection Components

- ▶ Security via Access Control List (ACL)
- ▶ Intrusion Protection System (IPS)
- ▶ Disabling of unused network ports
- ▶ Secure encrypted Backhaul between geographically dispersed locations
- ▶ Access Control and Password Protection
- ▶ FIPS 140-2 encryption

LMR Radio Components

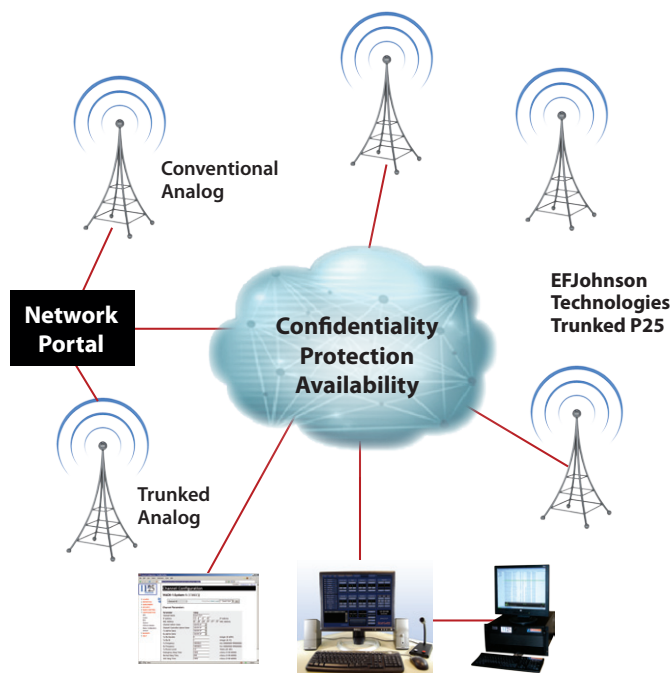
- ▶ User authorization for both conventional and trunked systems
- ▶ Centralized key management
- ▶ Activity monitoring and call tracking
- ▶ Secure voice and data communication
- ▶ Encrypted IP data links

Network Segmentation Equipment

- ▶ Firewall
- ▶ Boundary defense and network intrusion detection
- ▶ Remote access control through secure virtual private network (VPN)

Enhanced Operational Options

- ▶ System logging and auditing
- ▶ Backup and system restore
- ▶ Access control
- ▶ System update capabilities
- ▶ Time base synchronization



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